User's Manual

Model DY
Vortex Flowmeter
(Integral Type, Remote Type)
Model DYA
Vortex Flow Converter
(Remote Type)

digitalYEWFLO

IM 01F06A00-01EN

vigilantplant.®

YOKOGAWA
Yokogawa Electric Corporation

IM 01F06A00-01EN
17th Edition

Model DY Vortex Flowmeter (Integral Type, Remote Type) Model DYA Vortex Flow Converter (Remote Type)

IM 01F06A00-01EN 17th Edition

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Revision Information

1. INTRODUCTION

Thank you for purchasing the digitalYEWFLO vortex flowmeter.
To ensure correct use of the instrument, please read this manual thoroughly and fully understand how to operate the instrument before operating it.

■ Regarding This Manual

- This manual should be provided to the end user.
- The contents of this manual may be changed without prior notice.
- All rights are reserved. No part of this manual may be reproduced in any form without Yokogawa's written permission.
- Yokogawa makes no warranty of any kind with regard to this material, including, but not limited to, implied warranties of merchantability and suitability for a particular purpose.
- All reasonable effort has been made to ensure the accuracy of the contents of this manual. However, if any errors or omissions are found, please inform Yokogawa.
- The specifications covered by this manual are limited to those for the standard type under the specified model number break-down and do not cover custom-made instruments.
- Please note that this manual may not be revised for any specification changes, construction changes or operating part changes that are not considered to affect function or performance.
- Yokogawa assumes no responsibilities for this product except as stated in the warranty.
- If the customer or any third party is harmed by the use of this product, Yokogawa assumes no responsibility for any such harm owing to any defects in the product which were not predictable, or for any indirect damages.

■ Safety and Modification Precautions

- The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific WARNINGS given elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Yokogawa assumes no liability for the customer's failure to comply with these requirements. If this instrument is used in a manner not specified in this manual, the protection provided by this instrument may be impaired.
- Yokogawa will not be liable for malfunctions or damage resulting from any modification made to this instrument by the customer.
- The following safety symbol marks are used in this manual and instrument.

WARNING

A WARNING sign denotes a hazard. It calls attention to procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in injury or death of personnel.

CAUTION

A CAUTION sign denotes a hazard. It calls attention to procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of the product.

IMPORTANT

An IMPORTANT sign denotes that attention is required to avoid damage to the instrument or system failure.

NOTE

A NOTE sign denotes information necessary for essential understanding of operation and features.

1.1 Using This Instrument Safety

(1) Installation

WARNING

- Installation of the vortex flowmeter must be performed by expert engineer or skilled personnel. No operator shall be permitted to perform procedures relating to installation.
- The vortex flowmeter must be installed within the specification conditions.
- The vortex flowmeter is a heavy instrument. Be careful that no damage is caused to personnel through accidentally dropping it, or by exerting excessive force on the vortex flowmeter. When moving the vortex flowmeter, always use a trolley and have at least two people carry it.
- When the vortex flowmeter is processing hot fluids, the instrument itself may become extremely hot. Take sufficient care not to get burnt.
- Where the fluid being processed is a toxic substance, avoid contact with the fluid and avoid inhaling any residual gas, even after the instrument has been taken off the piping line for maintenance and so forth.
- Do not apply excessive weight, for example, a person stepping on the vortex flowmeter.
- Do not open the cover in wet weather or humid environment. When the cover is open, stated enclosure protection is not applicable.
- When opening the cover, wait for more than 2 minutes after turning off the power.
- All procedures relating to installation must comply with the electrical code of the country where it is used.

(2) Wiring

WARNING

- The wiring of the vortex flowmeter must be performed by expert engineer or skilled personnel. No operator shall be permitted to perform procedures relating to wiring.
- When connecting the wiring, check that the supply voltage is within the range of the voltage specified for this instrument before connecting the power cable. In addition, check that no voltage is applied to the power cable before connecting the wiring.

(3) Operation

WARNING

- Do not open the cover in wet weather or humid environment. When the cover is open, stated enclosure protection is not applicable.
- When opening the cover, wait for more than 2 minutes after turning off the power.

(4) Maintenance

WARNING

- Maintenance of the vortex flowmeter should be performed by the trained personnel having knowledge of safety standard. No operator shall be permitted to perform any operations relating to maintenance.
- Do not open the cover in wet weather or humid environment. When the cover is open, stated enclosure protection is not applicable.
- When opening the cover, wait for more than 2 minutes after turning off the power.
- Always conform to maintenance procedures outlined in this manual. If necessary, contact Yokogawa.

(5) Explosion Protected Type Instrument

WARNING

- The instruments are products which have been certified as explosion proof type instruments. Strict limitations are applied to the structures, installation locations, external wiring work, maintenance and repairs, etc. of these instruments. Sufficient care must be taken, as any violation of the limitations may cause dangerous situations. Be sure to read Chapter 14 “EXPLOSION PROTECTED TYPE INSTRUMENT” before handling the instruments. For TIIS flameproof type instruments, be sure to read “INSTALLATION AND OPERATING PRECAUTIONS FOR TIIS FLAMEPROOF EQUIPMENT” at the end of this manual.
- Only trained persons use this instrument in the industrial location.
- Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.

(6) European Pressure Equipment Directive (PED)

WARNING

- When using the instrument in compliance with PED, be sure to read Chapter 15 “PED (PRESSURE EQUIPMENT DIRECTIVE)” before use.

1.2 Warranty

- The terms of this instrument that are guaranteed are described in the quotation. We will make any repairs that may become necessary during the guaranteed term free of charge.
- Please contact our sales office if this instrument requires repair.
- If the instrument is faulty, contact us with concrete details about the problem and the length of time it has been faulty, and state the model and serial number. We would appreciate the inclusion of drawings or additional information.
- The results of our examination will determine whether the meter will be repaired free of charge or on an at-cost basis.

■ The guarantee will not apply in the following cases:

- Damage due to negligence or insufficient maintenance on the part of the customer.
- Problems or damage resulting from handling, operation or storage that violates the intended use and specifications.
- Problems that result from using or performing maintenance on the instrument in a location that does not comply with the installation location specified by Yokogawa.
- Problems or damage resulting from repairs or modifications not performed by Yokogawa or someone authorized by Yokogawa.
- Problems or damage resulting from inappropriate reinstallation after delivery.
- Problems or damage resulting from disasters such as fires, earthquakes, storms, floods, or lightning strikes and external causes.

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- In this manual, trademarks or registered trademarks are not marked with ™ or ®.

1.3 ATEX Documentation

This is only applicable to the countries in European Union.

GB
All instruction manuals for ATEX Ex related products are available in English, German and French. Should you require Ex related instructions in your local language, you are to contact your nearest Yokogawa office or representative.

DK
Alle brugervejledninger for produkter relateret til ATEX Ex er tilgængelige på engelsk, tysk og fransk. Skulle De ønske yderligere oplysninger om håndtering af Ex produkter på eget sprog, kan De rette henvendelse herom til den nærmeste Yokogawa afdeling eller forhandler.

I
Tutti i manuali operativi di prodotti ATEX contrassegnati con Ex sono disponibili in inglese, tedesco e francese. Se si desidera ricevere i manuali operativi di prodotti Ex in lingua locale, mettersi in contatto con l'ufficio Yokogawa più vicino o con un rappresentante.

E
Todos los manuales de instrucciones para los productos antiexplosivos de ATEX están disponibles en inglés, alemán y francés. Si desea solicitar las instrucciones de estos artículos antiexplosivos en su idioma local, deberá ponerse en contacto con la oficina o el representante de Yokogawa más cercano.

NL
Alle handleidingen voor producten die te maken hebben met ATEX explosiebeveiliging (Ex) zijn verkrijgbaar in het Engels, Duits en Frans. Neem, indien u aanwijzingen op het gebied van explosiebeveiliging nodig hebt in uw eigen taal, contact op met de dichtstbijzijnde vestiging van Yokogawa of met een vertegenwoordiger.

SF
Kaikkien ATEX Ex -tyyppisten tuotteiden käyttöhjeet ovat saatavilla englannin-, saksan- ja ranskankielisinä. Mikäli tarvitsette Ex -tyyppisten tuotteiden ohjeita omalla paikallisella kielellännne, ottakaa yhteyttä lähimpään Yokogawa-toimistoon tai -edustajaan.

P
Todos os manuais de instruções referentes aos produtos Ex da ATEX estão disponíveis em Inglês, Alemão e Francês. Se necessitar de instruções na sua língua relacionadas com produtos Ex, deverá entrar em contacto com a delegação mais próxima ou com um representante da Yokogawa.

F
Tous les manuels d'instruction des produits ATEX Ex sont disponibles en langue anglaise, allemande et française. Si vous nécessitez des instructions relatives aux produits Ex dans votre langue, veuillez bien contacter votre représentant Yokogawa le plus proche.

D
Alle Betriebsanleitungen für ATEX Ex bezogene Produkte stehen in den Sprachen Englisch, Deutsch und Französisch zur Verfügung. Sollten Sie die Betriebsanleitungen für Ex-Produkte in Ihrer Landessprache benötigen, setzen Sie sich bitte mit Ihrem örtlichen Yokogawa-Vertreter in Verbindung.

S
Alla instruktionsböcker för ATEX Ex (explosionssäkra) produkter är tillgängliga på engelska, tyska och franska. Om Ni behöver instruktioner för dessa explosionssäkra produkter på annat språk, skall Ni kontakta närmaste Yokogawakontor eller representant.

GR
Ολα τα εγχειρίδια λειτουργίας των προϊόντων με ATEX Ex διατίθενται στα Αγγλικά, Γερμανικά και Γαλλικά. Σε περίπτωση που χρειάζεστε οδηγίες σχετικά με Ex στην τοπική γλώσσα παρακαλούμε επικοινωνήστε με το πλησιέστερο γραφείο της Yokogawa ή αντιπρόσωπο της.

SK
Všetky návody na obsluhu pre prístroje s ATEX Ex sú k dispozícii v jazyku anglickom, nemeckom a francúzskom. V prípade potreby návodu pre Ex-prístroje vo Vašom národnom jazyku, skontaktujte prosím miestnu kanceláriu firmy Yokogawa.

CZ
Všechny uživatelské příručky pro výrobky, na něž se vztahuje nevýbušné schválení ATEX Ex, jsou dostupné v angličtině, němčině a francouzštině. Požadujete-li pokyny týkající se výrobků s nevýbušným schválením ve vašem lokálním jazyku, kontaktujte prosím vaši nejbližší reprezentační kancelář Yokogawa.

LT
Visos gaminiø ATEX Ex kategorijos Eksploatavimo instrukcijos teikiami anglø, vokieèiø ir prancûzø kalbomis. Norëdami gauti prietaisø Ex dokumentacijà kitomis kalbomis susisiekite su artimiausiu bendrovës "Yokogawa" biuru arba atstovu.

LV
Visas ATEX Ex kategorijas izstrâdâjumu Lietoðanas instrukcijas tiek piegâdâtas angïu, vâcu un franèu valodâs. Ja vçlaties saòemt Ex ierîèu dokumentâciju citâ valodâ, Jums ir jâsazinâs ar firmas Jokogava (Yokogawa) tuvâko ofisu vai pârstâvi.

EST
Kõik ATEX Ex toodete kasutamisjuhendid on esitatud inglise, saksa ja prantsuse keeles. Ex seadmete muukeelse dokumentatsiooni saamiseks pöörduge lähima lokagava (Yokogawa) kontori või esindaja poole.

PL
Wszystkie instrukcje obsługi dla urządzeń w wykonaniu przeciwwybuchowym Ex, zgodnych z wymaganiami ATEX, dostępne są w języku angielskim, niemieckim i francuskim. Jeżeli wymagana jest instrukcja obsługi w Państwa lokalnym ję zyku, prosimy o kontakt z najbliższym biurem Yokogawy.

SLO
Vsi predpisi in navodila za ATEX Ex sorodni pridelki so pri roki v angliščini, nemščini ter francošèini. Èe so Ex sorodna navodila potrebna v vašem tukejnjem jeziku, kontaktirajte vaš najbliši Yokogawa office ili predstaunika.

H
Az ATEX Ex mûszerek gépkönyveit angol, német és francia nyelven adjuk ki. Amennyiben helyi nyelven kérik az Ex eszközök leírásait, kérjük keressék fel a legközelebbi Yokogawa irodát, vagy képviseletet.

BG
Всички упътвания за продукти от серията ATEX Ex се предлагат на английски, немски и френски език. Ако се нуждаете от упътвания за продукти от серията Ex на родния ви език, се свържете с най-близкия офис или представителство на фирма Yokogawa.

RO
Toate manualele de instructiuni pentru produsele ATEX Ex sunt in limba engleza, germana si franceza. In cazul in care doriti instructiunile in limba locala, trebuie sa contactati cel mai apropiat birou sau reprezentant Yokogawa.

M
Il-manwali kollha ta' l-istruzzjonijiet għal prodotti marbuta ma' ATEX Ex huma disponibbli bl-Ingliż, bil-Ġermaniż u bil-Franċiż. Jekk tkun teħtieġ struzzjonijiet marbuta ma' Ex fil-lingwa lokali tiegħek, għandek tikkuntattja lill-eqreb rappreżentan jew uffiċċju ta' Yokogawa.

2. HANDLING PRECAUTIONS

The Model DY Vortex Flowmeter and Model DYA Vortex Flow Converter are thoroughly tested at the factory before shipment. When these instruments are delivered, perform a visual check to ascertain that no damage occurred during shipment.
This section describes important cautions in handling these instruments. Read carefully before using them.
If you have any problems or questions, contact your nearest YOKOGAWA service center or sales representative.

2.1 Checking Model and Specifications

The model and important specifications are indicated on the name plate attached to the case. Verify that they are the same as those specified in the original order, refer to Chapter 13 “GENERAL SPECIFICATIONS .” In any correspondence, always give model (MODEL) and serial number (NO.) from the name plate.

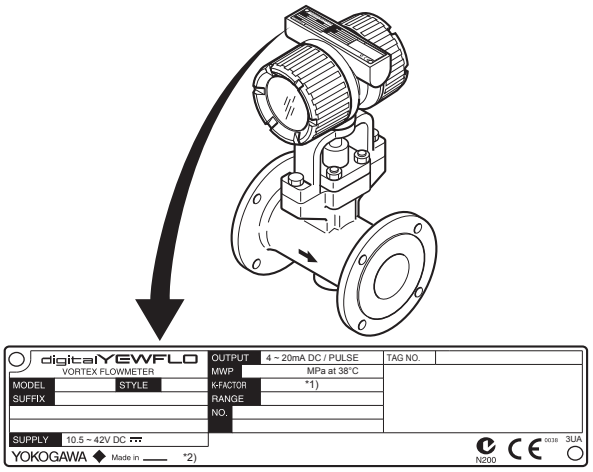

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Figure 2.1(a) Example of Name Plate for Integral Type

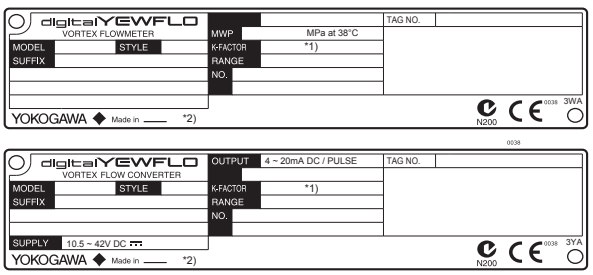

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Figure 2.1(b) Example of Name Plate for Remote Type

*1): K factor at + 15°C
*2): The product - producing country.

2.2 Transportation and Storage Precautions

If the instrument is to be stored for a long period of time after delivery, observe the following points.

(1) The instrument should be stored in its original packing condition in the storage location.
(2) Select a storage location that fulfils the following conditions:
- A place where it will not be exposed to rain or water
- A place subject to minimal vibrations or shocks
- Temperature and humidity levels should be as follows:
  Temperature:-40 to +80°C
  Humidity:5 to 100% RH (no condensation)
  The preferred ambient temperature and humidity levels are +25°C and approximately 65% RH.

(3) If the digitalYEWFLO vortex flowmeter is transferred to the installation site and stored without being installed, its performance may be impaired due to the infiltration of rainwater and so forth. Be sure to install and wire the digitalYEWFLO vortex flowmeter as soon as possible after transferring it to the installation location.
(4) The vortex flowmeter is a heavy instrument. Be careful that no damage is caused to personnel through accidentally dropping it, or by exerting excessive force on the vortex flowmeter. When moving the vortex flowmeter, always use a trolley and have at least two people carry it.

3. INSTALLATION

WARNING

This instrument must be installed by expert engineer or skilled personnel. The procedures described in this chapter are not permitted for operators.

3.1 Installation Precautions

(1) Ambient Temperature

Avoid an area which has wide temperature variations. When the installation area is subjected to heat radiation from process plant, ensure adequate heat prevention or ventilation.

(2) Atmospheric Conditions

Avoid installing the vortex flowmeter in a corrosive atmosphere. When the vortex flowmeter must be installed in a corrosive atmosphere, adequate ventilation must be provided

(3) Mechanical Shock or Vibration

The vortex flowmeter is of sturdy construction, but select an area subject to minimize mechanical vibration or impact shock. If the flowmeter is subject to vibrations, it is recommended that pipeline supports to be provided as shown in Figure 3.1.

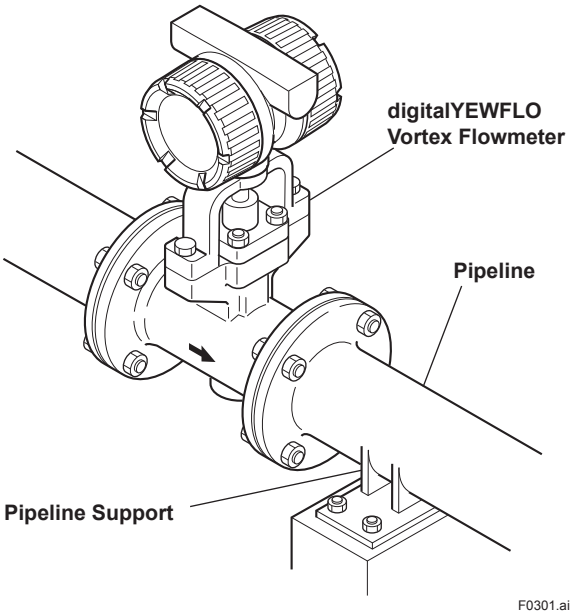


Figure 3.1 Example of Pipeline Support

(4) Precautions Regarding Piping

(a) Ensure that the process connector bolts are tightened firmly.
(b) Ensure that no leak exists in the process connection pipeline.
(c) Do not apply a pressure higher than the specified maximum working pressure.
(d) Do not loosen or tighten the flange mounting bolts when the assembly is pressurized.
(e) Handle the vortex flowmeter carefully when measuring dangerous liquids, so that the liquids do not splash into eyes or on face. When using dangerous gases, be careful not to inhale them.

(5) Other Considerations

- Choose a location where is sufficient clearance around digitalYEWFLO exist to allow such work as routine inspections.
- Choose a location that ensures easy wiring and piping.

3.2 Piping Precautions

■ Straight Pipe Length and Recommendations

Refer to Table 3.1 about Valve Position and Straight Pipe Length and so on.

● Piping support

Typical vibration immunity level is 1G for normal piping condition.Piping support should be fixed in case of over 1G vibration level.

● Installation direction

If a pipe is always filled with liquids, the pipe can be installed vertically or at inclined angle.

● Adjacent pipes

The process pipline inner diameter should be larger than the digitalYEWFLO inner diameter.
Use the following adjacent pipe.

Model Code	Adjacent Pipe
DY015 up to DY050 DY025/R1 up to DY080/R1 DY040/R2 up to DY100/R2	Sch40 or larger inner diameter than Sch40
DY080 up to DY400 DY100/R1 up to DY200/R1 DY150/R2 up to DY200/R2	Sch80 or larger inner diameter than Sch80

Table 3.1 (a) Straight pipe length and recommendations (1)

D: Nominal diameter (mm)

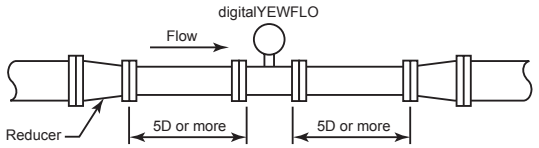
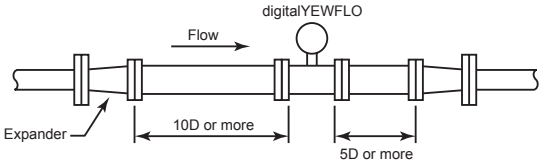
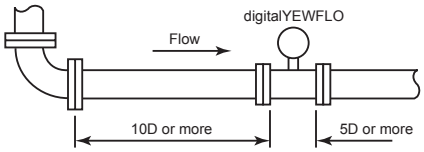
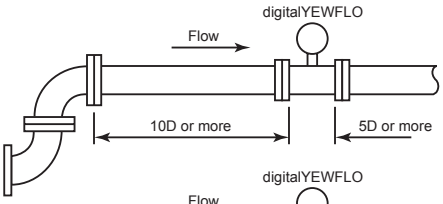
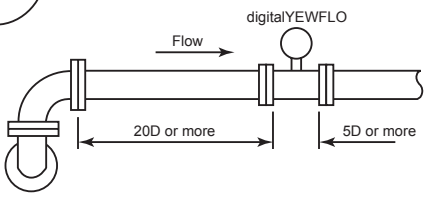
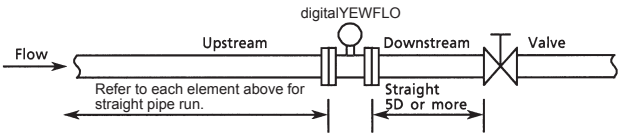
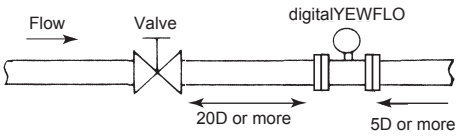
Description	Figure
Reducer pipe: Ensure the upstream straight pipe length to be 5D or more, and the downstream straight pipe length to be 5D or more for per reducer pipe.	
Expander pipe: Ensure the upstream straight pipe length to be 10D or more, and the downstream straight pipe length to be 5D or more for per expander pipe.	
Bent pipe and straight pipe length: 1. Single bent pipe 2. Double bent pipe; coplanar 3. Double bent pipe; non coplanar	1.  2.  3. 
Valve position and straight pipe length: ■ Install the valve on the downstream side of the flowmeter. The upstream straight pipe length dependent on the element located on the upstream such as reducer/expander, bent and etc., refer to description as above. Keep 5D or more for downstream straight pipe length. ■ In case the valve has to be installed on the upstream of the flowmeter, ensure the upstream straight pipe length to be 20D or more, and the downstream straight pipe length be 5D or more.	 

Table 3.1 (b) Straight pipe length and recommendations (2)

D: Nominal diameter (mm)

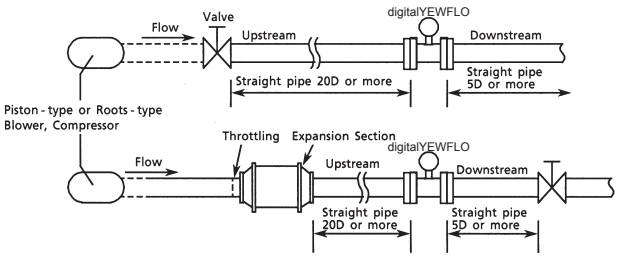
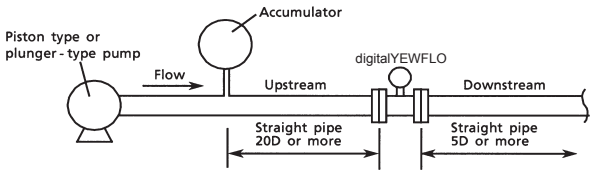
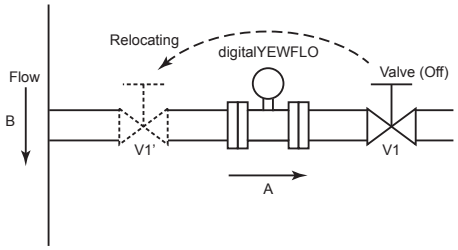
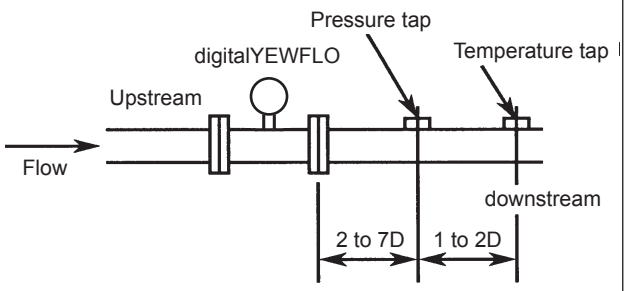
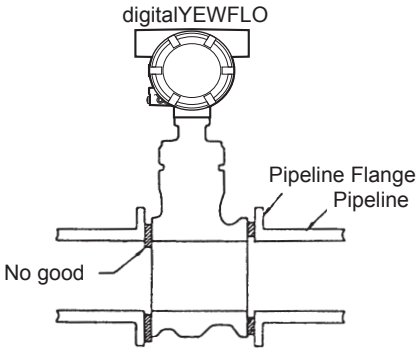
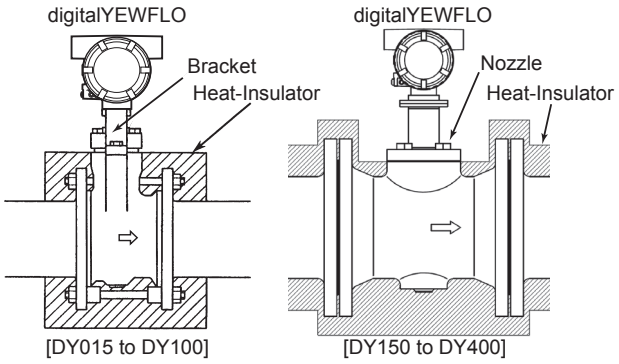
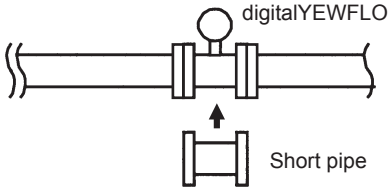
Description	Figure
Fluid vibration: For a gas line which uses a position-type or roots-type blower compressor or a high-pressure liquid line (about 1MPa or more) which uses piston-type or plunger-type pump, fluid vibrations may be produced. In these case, install valve on the upstream side of digitalYEWFLO. For inevitable fluid vibration, put a vibration damping device such as throttling plate or expansion section in the upstream side of digitalYEWFLO.	
Piston-type or plunger pump: Install the accumulator on the upstream side of digitalYEWFLO to reduce fluid vibrations.	
Valve positon (T-type piping exist): When pulsation causes by a T-type piping exist, install the valve on the upstream of the flowmeter. Example: As shown in the figure, when the valve V1 is turned off, the fluid flow throught B as to meter A the flow is zero. But due to the pulsating pressure is detected, the meter is zero point become fluctuating. To avoid this, change the valve V1 location to V1'. Note: In case of the Reduced Bore Type, moisture may be remained upstream of the flowmeter. Drain it appropriately.	
Pressure and Temperature Taps: Pressure tap outlet: install this tap between 2D and 7D on the downstream side of a flowmeter. Temperature tap outlet: install this on the downstream side 1D to 2D away from a pressure tap.	
Mounting Gasket: Avoid mounting gaskets which protrude into the pipe line. This may cause inaccurate readings. Use the gaskets with bolt holes, even if digitalYEWFLO is the wafer type. When using a spiral gasket (without bolt holes), confirm the size with the gasket -manufacturer, as standard items may not be used for certain flange ratings.	

Table 3.1 (c) Straight pipe length and recommendations (3)

Description	Figure
Heat-Insulation: When an integral-type flowmeter or a remote type detector is installed and the pipe carrying higt-temperature fluids is heat-insulated, do not wrap adiabatic materials around the installation the bracket (DY015 to DY100) or the nozzle (DY150 to DY400) of the converter. Note: Refer to Section 3.4 "Cryogenic and High Process Temperature Version Insulation" and install it rightly.	
Flushing of the pipe line: Flush and clean scale, incrustation and sludge on the inside of pipe for newly installed pipe line and repaired pipe line before the operation. For flushing, the flow should flow through bypass-piping to avoid damaging the flowmeter. If there is no bypass-piping, install short pipe instead of the flowmeter.	

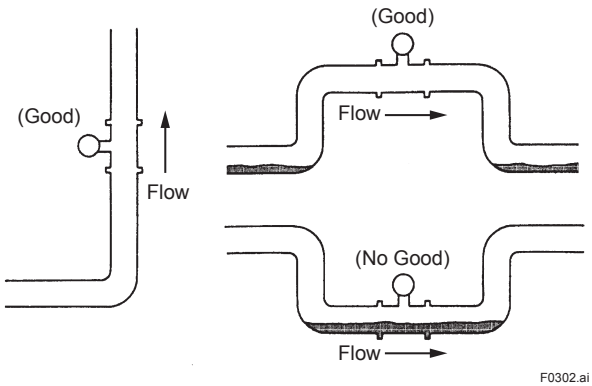
■ Mounting Precautions

WARNING

In case of high process temperature, care should be taken not to burn yourself because the surface of body and case reach a high temperature.

(1) Gas or Steam Measuring Precautions

- Piping to Prevent Standing Liquid
  Mount digitalYEWFLO in a vertical pipeline to avoid liquid traps. When digitalYEWFLO is installed horizontally, raise that part of the pipeline in which the digitalYEWFLO is installed.



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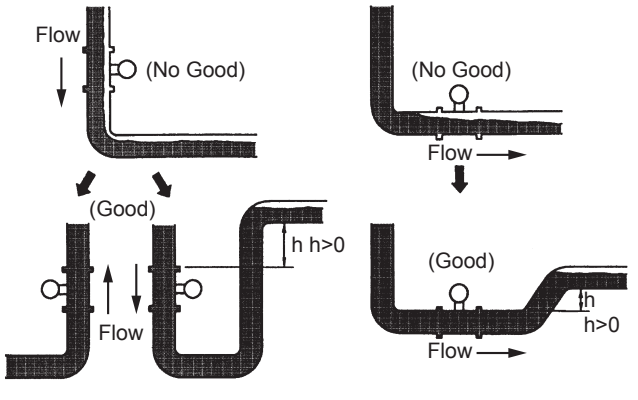
(2) Liquid Measurement Precautions

To insure accurate measurement, the digitalYEWFLO must always have a full pipe.

- Piping Requirements for Proper Operation
  Allow the flow to flow against gravity. When the flow is moving with gravity, lift the down-stream pipe length above the digitalYEWFLO installation level to maintain full pipeline.



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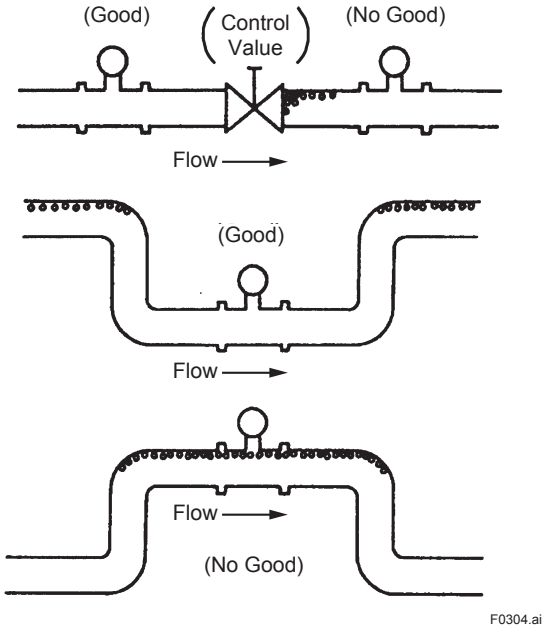
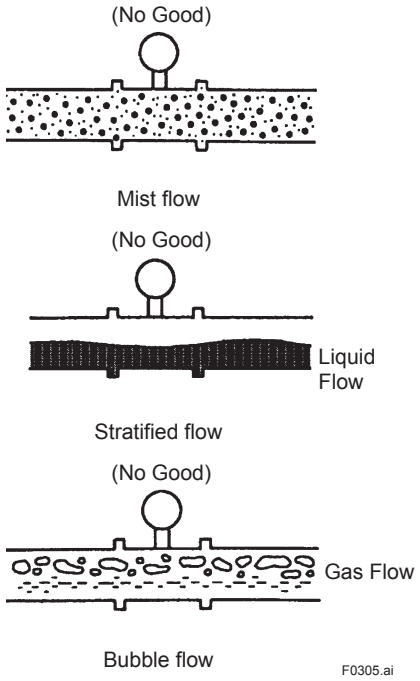
- **Piping for Avoiding Bubbles**

  Flows containing both gas and liquid cause problems. Avoid gas bubbles in a liquid flow. Piping should be carried out to avoid bubble generation.
  Install the valve on the downstream side of the flowmeter because pressure drop across the control valve may cause gas to come out of the solution.



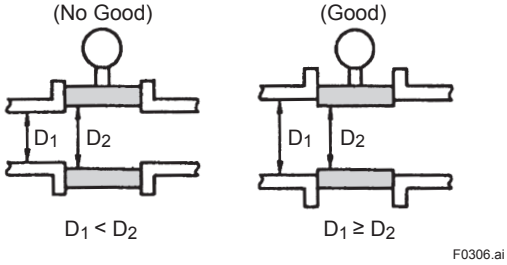
(3) Multi-Phase Flow

digitalYEWFLO can measure gas, liquid and steam when there is no change in state. However, accurate measurement of mixed flows (e.g. gas and liquid) is not possible.



(4) Pipeline Diameter and digitalYEWFLO

The process pipeline inner diameter should be slightly larger than the vortex flowmeter inner diameter, schedule 40 or lower pipe should be used for 1/2 to 2 inch flowmeters and schedule 80 or lower pipes for 3 to 16 inch flowmeters.



(5) Waterproof Construction

The vortex flowmeter is of IP67, Type 4X, JIS C 0920 watertight protection. However, it cannot be used under water.

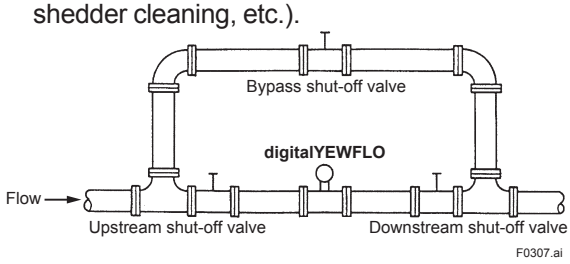
3.3 Maintenance of Piping

(1) Pipe cleaning

- Flushing of pipe line (Cleaning)
  Flush and clean scale, incrustation and sludge on the inside of pipe wall for newly installed pipe line and repaired pipe line before the operation.
- Fluid Carrying Solids
  Do not measure fluids that carry solids (e.g. sand and pebbles). Make sure users periodically remove solids adhering to the vortex shedder.
- Obstruction of flow fluids may cause to make a chemical reaction and the fluid will be crystallized and hardened, and be deposited on the pipe wall and shedder bar.
  In those cases, clean shedder bar.

(2) Bypass piping

Bypass piping is convenient for the maintenance of digitalYEWFLO (vortex shedder cleaning, etc.).



3.4 Cryogenic and High Process Temperature Version Insulation

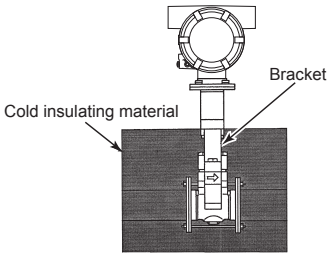
When you are using Cryogenic and High Process Temperature version of digitalYEWFLO Vortex Flowmeter (Option code: /HT, /LT), refer to following contents.

■ Installing Cryogenic Version

For cryogenic applications, use stainless steel mounting bolts and nuts to install the flowmeter. These can be ordered separately from YOKOGAWA. Cover the flowmeter body with heat insulating material so that the flowmeter can be maintained at ultra-low temperatures.

■ Maintenance for Cryogenic Applications

DY/LT uses special materials that produce vortex flowmeter for cryogenic applications. When you are replacing a shedder bar, specify Cryogenic Version shedder bar. To avoid condensing in the terminal box, ensure that the wire connecting port is well sealed.



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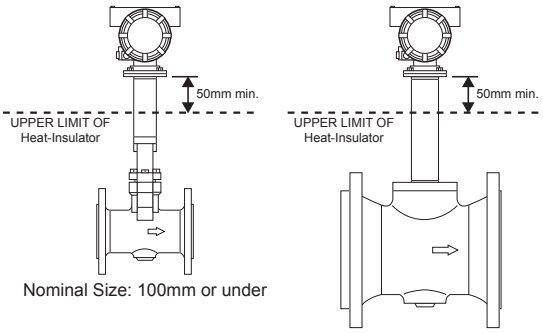
■ Installing High Process Temperature Version

Installation of the flowmeter is the same as the standard type. Cover the flowmeter body with heat insulating material following instruction of “CAUTION”.

CAUTION

Keep the upper limit of heat insulating material to prevent overheating of the terminal box.
Seal the Heat-Insulator to avoid hot-air leakage.



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■ Maintenance for High Process Temperature Applications

DY/HT uses special materials that produce vortex flowmeter for High Process Temperature applications When you are replacing a shedder bar or a gasket, specify High Process Temperature Version.

3.5 Mounting Procedures

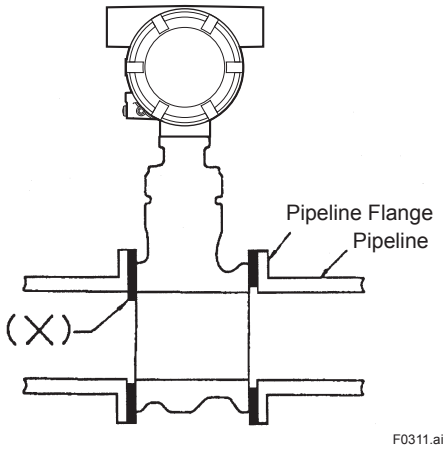
WARNING

The Vortex Flowmeter is a heavy instrument. Please be careful to prevent persons from injuring whin it is handled.

Before installing the instrument verify the following. The direction of flow should match to the arrow mark on the instrument body. When changing the orientation of the terminal box, refer to Chapter 11 “MAINTENANCE.”

1. Installation of Vortex flowmeter of the wafer and flange type is shown in Table 3.3.
   When installing the wafer type vortex flowmeter, it is important to align the instrument bore with the inner diameter of the adjacent piping.
   To establish alignment, use the four collars supplied with the instrument.

- Four collars are supplied for 1/2 inch (15mm) to 1- 1/2inch (40mm), 2 inch of JIS 10K or ANSI class 150, and 3 inch of ANSI class 150. Install the instrument as illustrated in Table 3.3.
- If the adjacent flanges have eight bolt holes, insert the stud bolts in the holes on the instrument shoulder.
- Stainless steel stud bolts and nuts are available on order. When they are to be supplied by the user, refer to Table 3.2 for stud bolt length. Gaskets must be supplied by the user.



2. Avoid mounting gaskets which protrude into the pipeline. This may cause inaccurate readings. Use gaskets with bolt holes, even if digitalYEWFLO is of the wafer type. When using a spiral gasket (without bolt holes), confirm the size with the gasket-manufacturer, as standard items may not be used for certain flange ratings.

Table 3.2 Flange Rating

Size mm (inch)	Flange Rating	Major Diameter of External Threed of Stud Bolt d (mm)	Length ℓ (mm)
15mm (1/2B)	JIS 10K, 20K/DIN 10, 16,25,40 JIS 40K ANSI 150, 300, 600	12 16 12.7	160 160 155
25mm (1B)	JIS 10K, 20K, 40K ANSI 150 ANSI 300, 600 DIN 10, 16, 25, 40	16 12.7 15.9 12	160 155 160 160
40mm (1-1/2B)	JIS 10K, 20K/DIN 10, 16, 25, 40 JIS 40K ANSI 150 ANSI 300, 600	16 20 12.7 19.1	160 170 155 170
50mm (2B)	JIS 10K, 20K, 40K/ DIN 10, 16, 25, 40 ANSI 150, 300, 600	16 15.9	200 200
80mm (3B)	JIS 10K/DIN 10, 16, 25, 40 JIS 20K, 40K ANSI 150 ANSI 300, 600	16 20 15.9 19.1	220 240 240 240
100mm (4B)	JIS 10K/DIN 10, 16 JIS 20K/DIN 25, 40 JIS 40K ANSI 150 ANSI 300 ANSI 600	16 20 22 15.9 19.1 22.2	220 240 270 240 240 270

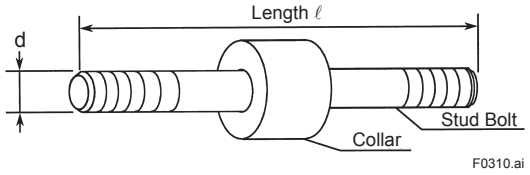


Table 3.3 (a) Installation of Wafer Type Vortex Flowmeter

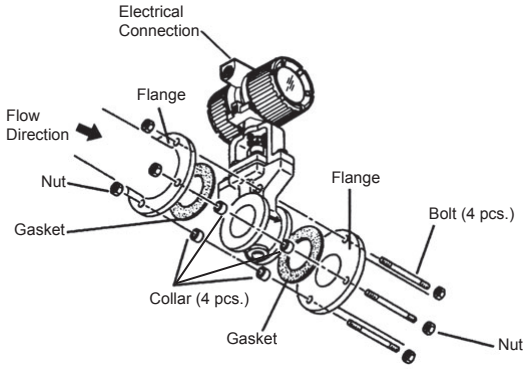
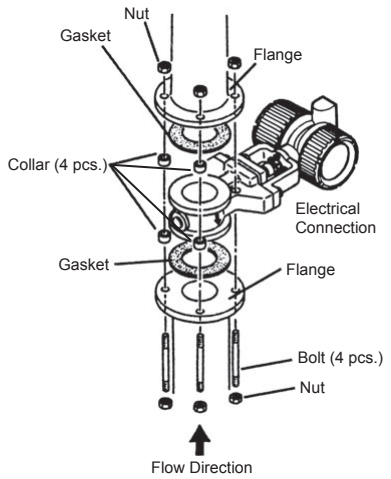
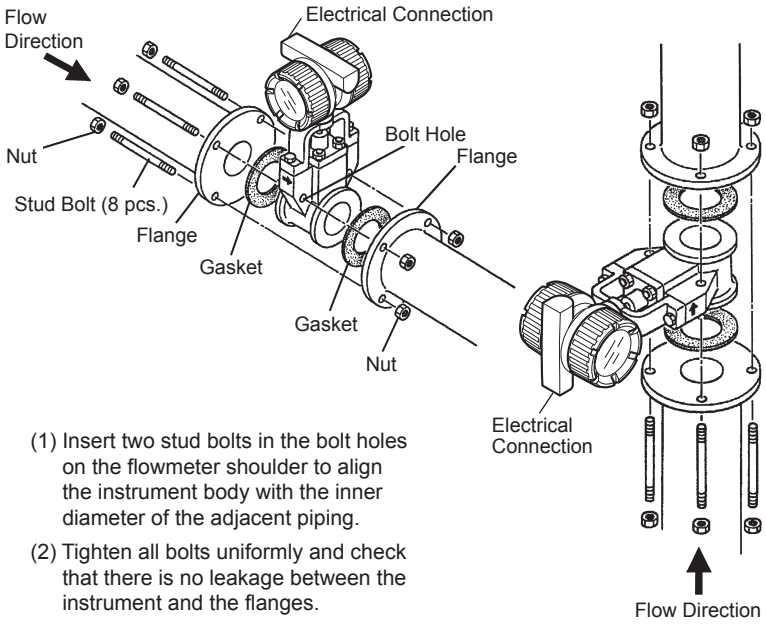
Wafer type	Description
When Installation Collar are required, the installation vortex flowmeters applied to the following line sizes and flange ratings. **Size mm (inch) / Flange Rating** 15 to 40 (1/2 to 1-1/2) — All ratings 50(2) — JIS 10K, ANSI class 150, DIN PN10 to PN40 80(3) — ANSI class 150 **WARNING** The inside diameter of the gasket must be larger than the pipe inner diameter so that it will not disturb the flow in the pipeline. **WARNING** When installing the Flowmeter vertically in the open air, change the electrical connection port direction to the ground. If the electrical connection port is installed upwards, rain water might leak in. **WARNING** In case of vertical installation, two collars in the upper part might move after the installation. But it doesn't influence the performance, please use the flowmeter under such condition.	**Horizontal Installation**  **Vertical Installation**  (1) Insert two collars on each two bolts of bottom side of the flowmeter. (2) Fit the flowmeter body to the collars. And tighten the four bolts and nuts uniformly. (3) Check for leakage from the flange connections.
When Installation Collars are not required,the installation vortex flowmeters applied to the following line sizes and flanges. **Size mm (inch) / Flange Rating** 50(2) — JIS 20K, 40K ANSI class 300,600 80(3) — JIS 10K, 20K, 40K ANSI class 300, 600 100(4) — JIS 10K, 20, 40K ANSI class 150, 300, 600	**Horizontal Installation** **Vertical Installation**  (1) Insert two stud bolts in the bolt holes on the flowmeter shoulder to align the instrument body with the inner diameter of the adjacent piping. (2) Tighten all bolts uniformly and check that there is no leakage between the instrument and the flanges.

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Table 3.3 (b) Installation of Flange Type Vortex Flowmeter

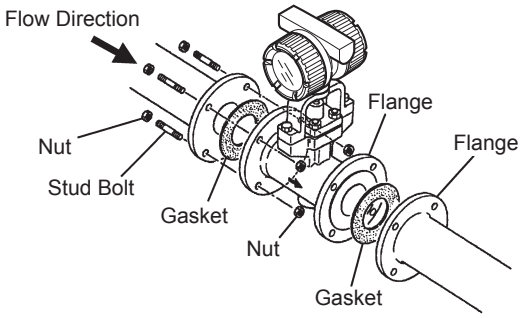
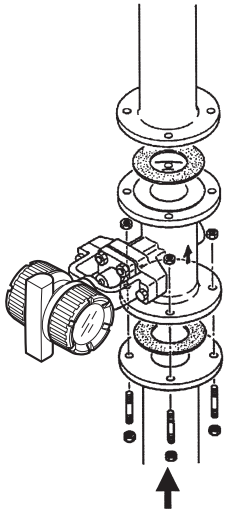
Flange type	Description
Use the stud bolts and nuts supplied with the flowmeter of the user. The gaskets should be supplied by the user. **CAUTION** The inside diameter of the gasket must be larger than the pipe inner diameter so that it will not disturb the flow in the pipeline.	**Horizontal Installation**   **Vertical Installation**

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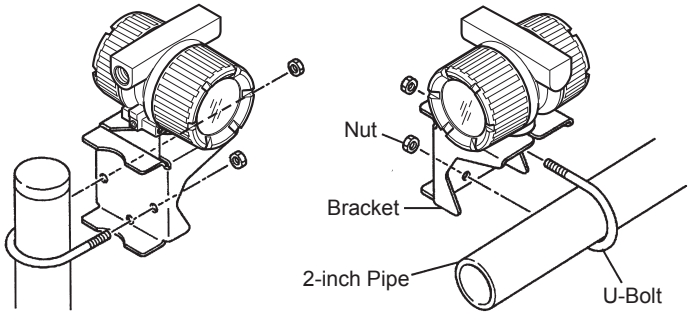
Table 3.3 (c) Installation of Remote Type Converter

Remote type converter	Description
CAUTION A signal cable (DYC) is used between the remote type flowmeter and the converter. The maximum signal cable length is 97.5ft (30m).	The converter is mounted on a 2-inch (60.5mm outer dia.) stanchion or horizontal pipe. Do not mount the converter on a vertical pipe. It makes wiring and maintenance difficult. The converter mounting orientation can be changed as illustrated below. **Stanchion Mounting** **Horizontal Pipe Mounting** 

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4. WIRING

WARNING

The wiring of the vortex flowmeter must be performed by expert engineer or skilled personnel. No operator shall be permitted to perform procedures relating to wiring.

CAUTION

Once all wiring is complete, check the connections before applying power to the instrument. Improper arrangements or wiring may cause a unit malfunction or damage.

4.1 Load Resistance of Output Condition

Be sure to observe the following precautions when wiring:

CAUTION

- When the ambient temperature of the wire exceeds +60°C, use heat-resistant insulated wire with a maximum allowable temperature more than ambient temperature +30°C or above.
- Do not connect cables outdoors in wet weather in order to prevent damage from condensation and to protect the insulation.
- Do not splice the cable between the flowtube terminal and the converter if it is too short. Replace the short cable with a cable that is the appropriate length.
- All the cable ends must be provided with round crimp-on terminals and be securely wired.
- Be sure to turn power off before opening the cover.
- Before turning the power on, tighten the cover securely.
- Explosion protected types must be wired in accordance with specific requirement (and, in certain countries, legal regulations) in order to preserve the effectiveness of their explosion protected features.
- The terminal box cover is locked by the Locking Screw. In case of opening the terminal box cover, use the hexagonal wrench attached.
- Be sure to lock the cover by the Locking Screw using the hexagonal wrench attached after installing the cover.

Table 4.1 shows the connection method of several output conditions.

(1) Analog Output (4 to 20 mA DC)

This converter uses the same two wires for both, the signal and power supply. A DC power supply is required in a transmission loop. The total leadwire resistance including the instrument load and power distributor (supplied by the user) must conform to a value in the permissible load resistance range. Refer to Figure 4.1.

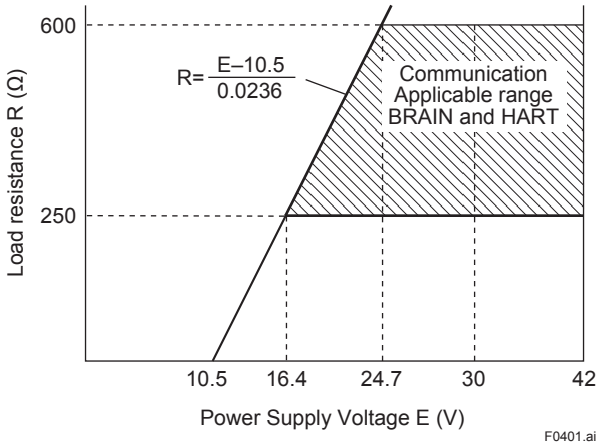


Figure 4.1 Relationship between Power Supply Voltage and Load Resistance (4 to 20 mA DC Output)

(2) Pulse output and Alarm, Status Output

This version uses three wires between the converter and the power supply. A DC power and load resistance are required, and pulse output is connected to a totalizer or an electric counter. Low level of the pulse output is 0 to 2V. No communication is possible over a transmission line. Communication via the amplifier board is always possible irrespective of the wiring condition.

(3) Simultaneous Analog-Pulse Output

When using digitalYEWFLO in the simultaneous analog -pulse output mode, the communicable distance of the transmission line is restricted on the wiring method. Table 4.1 shows the examples of connection for this output mode. Communication via the amplifier board is always possible irrespective of the wiring condition.

IMPORTANT

For pulse output and the simultaneous analog-pulse output ,use the load resistance. Refer to Table 4.1.

4.2 Selection of Wires

The following should be taken into consideration when selecting cables for use between the converter and distributor.

(1) Use 600V PVC insulated wire or equivalent standard wire or cable.
(2) Use shielded wire in areas susceptible to electrical noise (both analog and pulse output versions).
(3) In areas with high or low ambient temperatures, use wires or cables suitable for such temperatures.
(4) In atmospheres where oils or solvents, corrosive gases or liquids may be present, use suitable wires or cables.
(5) Use cable which withstand temperature up to +60°C and more, when ambient temperature is more than +60°C.
(6) The outer diameter of the screw for grounding terminal and the cable terminal is 4mm.
(7) Recommend a crimping terminal with an insulating sleeve (for 4mm screw).

IMPORTANT

For the remote type, use DYC signal cable to connect the converter and remote type flowmeter(DY-N).

4.3 Connection

Table 4.1 shows the connection sample of connection for power supply and load resistance. The terminal position of each connection is shown in Figure 4.2.

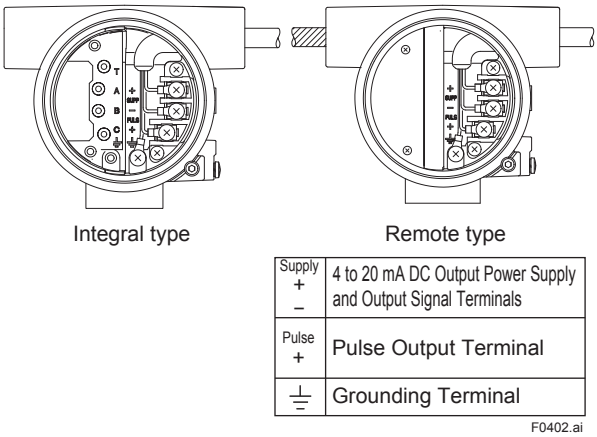
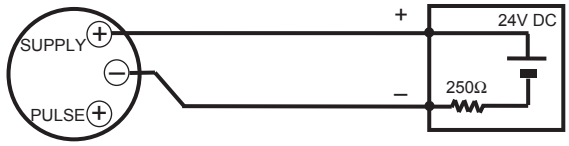
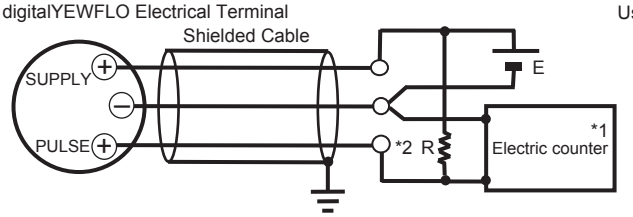
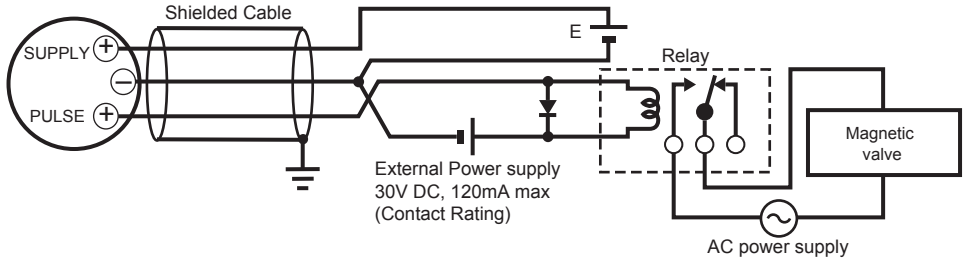


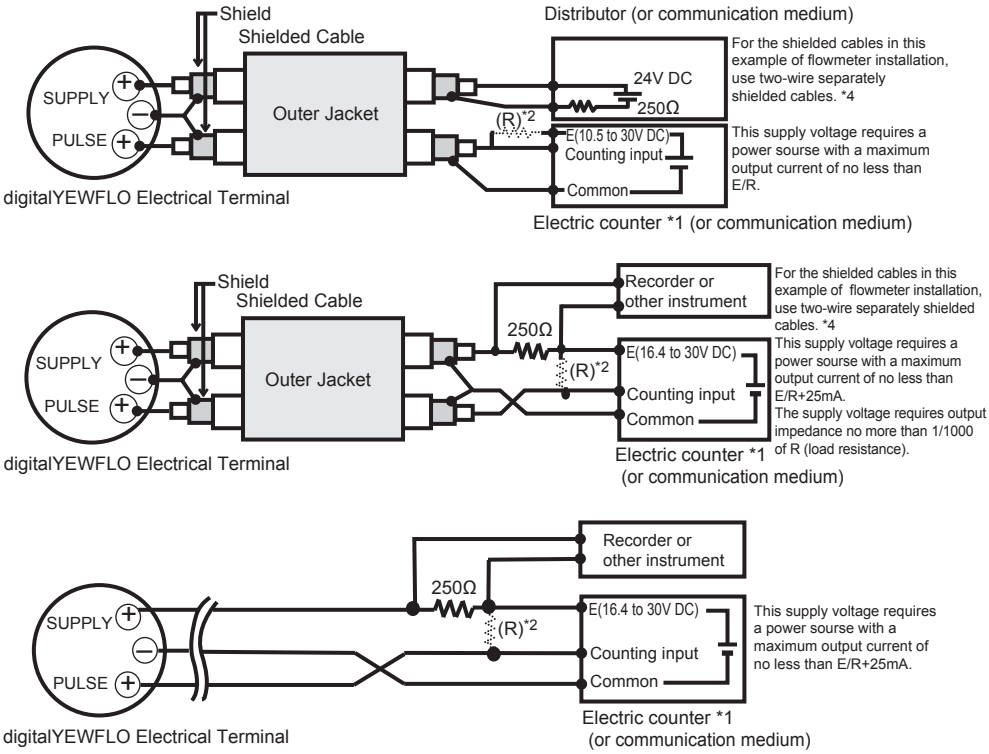
Figure 4.2 Terminal Position

Table 4.1 (a) The wiring example for the analog and pulse and status, alarm output.

Connection	Description
Analog Output In this case, Communication is possible (up to a distance of 2km when a CEV cable is used.)	digitalYEWFLO Electrical Terminal 
Pulse Output In this case, No communication is possible.	digitalYEWFLO Electrical Terminal Use the Three-wire shielded cable.  This supply voltage requires a power sourse with a maximum output current of no less than E/R+25mA.
Status Output Alarm Output In this case, No communication is possible.	digitalYEWFLO Electrical Terminal Use the Three-wire shielded cable. 

*1: To avoid the influence of external noise, use an electric counter which fits to the pulse frequency.
*2: Resistor is not necessary in case of an electric counter which can receive contact pulse signal directly.

Table 4.1 (b) The wiring example for the simultaneous analog and pulse output, the calculation formula of the range of load registance R for the pulse output.

Connection	Description
Simultaneous Analog -Pulse Output *3 **Example 1** In this case, Communication is possible(up to a distance of 2km when a CEV cable is used). **Example 2** In this case, Communication is possible (up to a distance of 200m when a CEV cable is used) and R = 1kΩ). **Example 3** In this case, No communi -cation is possible (when shielded cable is not used).	When analog and pulse output are used, the length of communication line is subjected to wiring conditions. Refer to example 1 to 3. If the communication carries out from amplifier, no need to consider wiring conditions. 
The range of load resistance R for the pulse output.	The load resistance should be selected by calculation as shown below. $\frac{E\,(V)^{*5}}{120} \leqq R\,(k\Omega) \leqq \frac{0.1}{C\,(\mu F) \times f\,(kHz)}$ Example of CEV cable capacitance ≒ 0.1μF/km $P\,(mW) = \frac{E^2\,(V)}{R\,(k\Omega)}$ Where E = Supply voltage (V) f = Frequency of pulse output (kHz) R = Value of load resistance (kΩ) C = Cable capacitance (μF) P = Power ratio of the load resistance (mW)

*1: To avoid the influence of external noise, use an electric counter which fits to the pulse frequency.
*2: Resistor is not necessary in case of an electric counter which can receive contact pulse signal directly.
*3: When using analog and pulse output simultaneously, the HART communication may be influenced by noise comparing analog output only.
*4: Signal Cable for ADMAG AXF, AXFC-0 (No Termination) is available.
*5: $\frac{E(V)}{80}$ Option code: /KS2, /SS2

4.4 Connection of DYC Signal Cable

The remote type signal cable is shown in Figure 4.3 and Figure 4.4, and the terminal is shown in Figure 4.5.
The maximum cable length is 30 m (97.5 feet).
Remove terminal box cover and wiring connection dust-cap before wiring.
For remote type the converter has two electrical connections (cable inlets). Use the left connection as viewed from the terminal box for the DYC signal cable and the right connection for the transmission cable.
If a signal cable kit is supplied by YOKOGAWA, both ends of the cable must be finished in accordance with the following instructions. Refer to Section 4.5 “End Processing Method of DYC Signal Cable“.

CAUTION

After completing the signal cable connections, install the shielded cover to signal cable terminal as shown in Figure 4.6.

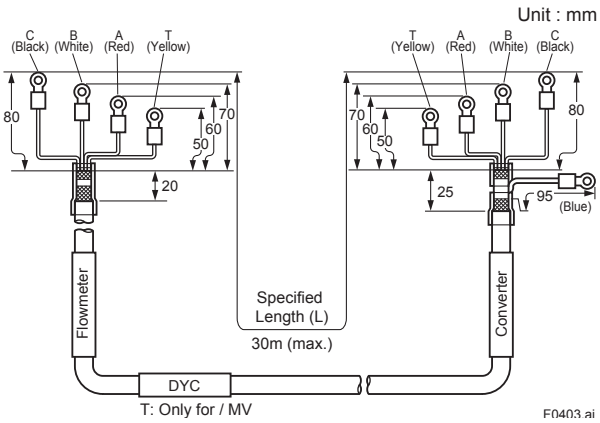


Figure 4.3 DYC Signal Cable

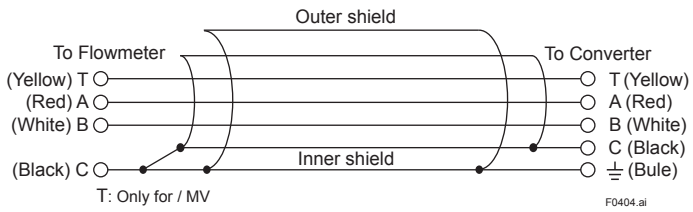


Figure 4.4 Construction of DYC Signal Cable

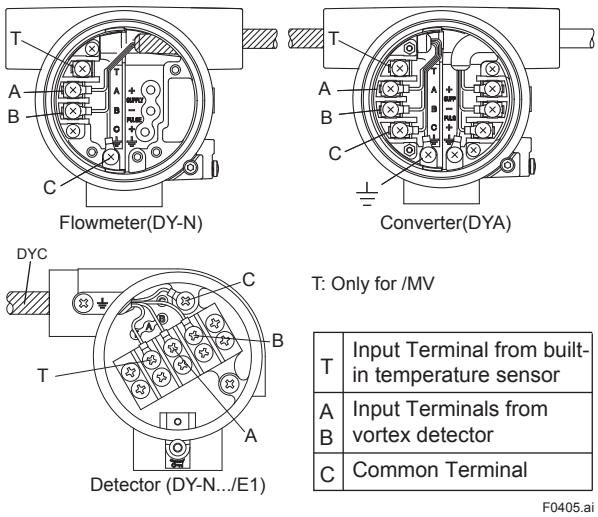


Figure 4.5 Terminal of Detector and Converter

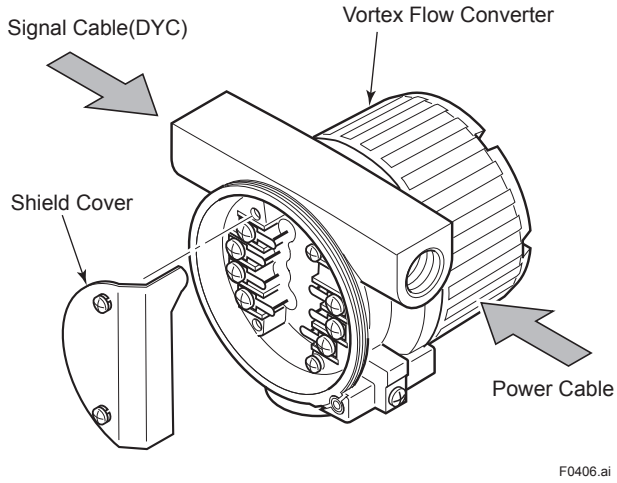
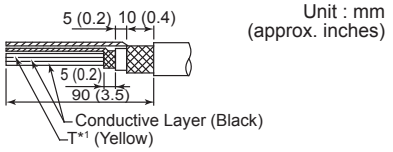
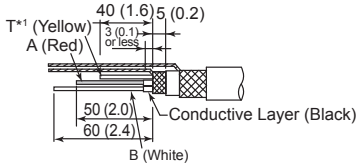
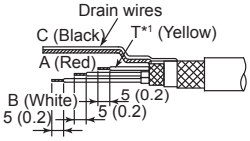
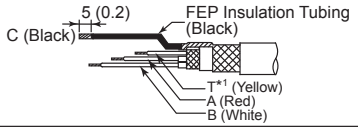
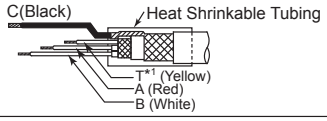
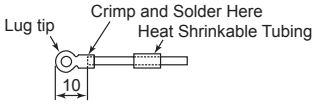
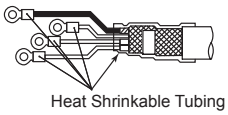
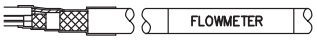


Figure 4.6 Shielded Cover

4.5 End Processing Method of DYC Signal Cable

4.5.1 For Vortex Flowmeter (DY-N)

	Description	Figure
1	Strip off the outer polyethylene jacket, outer braided shield and inner jacket, and inner braided shield as per the dimensions below.	
2	Strip off the black conductive layer convering two wires completely, as per the dimensions below. Twist each of the conductor and drain wires so that there are no free strands.	
3	Do not short-circuit the conductive layer and the terminals (A, B, C and T*1).	
4	Strip off about 5 mm (0.2 in.) of insulation for each of wires A, B, and T*1, and twist the strands of each wire. Twist the inner and outer drain wires together.	
5	Slide FEP (fluorinated ethylene propylene) tubing over the twisted inner and outer drain wires C until the tubing cannot be slid any further, and then cut off the tubing leaving 5 mm (0.2 in.) of the stranded drain wires exposed.	
6	Slide heat shrinkable tubing over the cable end so that the tubing covers the braided shield and overlaps both the polyethylene jacket and loose wires A, B, C, and T*1.	
7	Slide a short piece of heat shrinkable tubing over each of wires A, B, C, and T*1. Install a crimp-on terminal lug at the tip of each wire. Crimp and solder each lug.	
8	Slide each short piece of heat shrinkable tubing over the crimp sleeve. Heat all pieces of heat shrinkable tubing with a heat blower or dryer.	
9	Attach an identification label to the end of the cable. **NOTE** Check that the insulation resistance between each wire including the inner shield is 10M or greater at 500V DC. Ensure that both ends of the wires are disconnected (open-circuited) during the check.	

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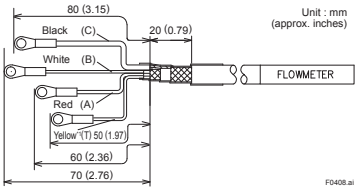
(*1): Only for /MV



NOTE

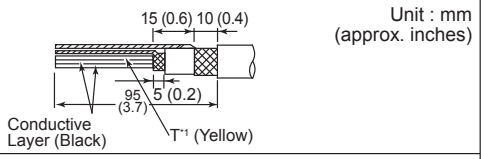
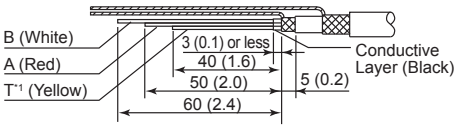
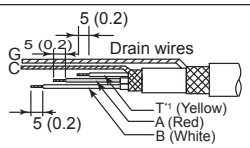
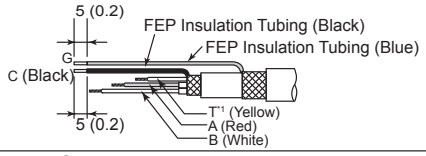
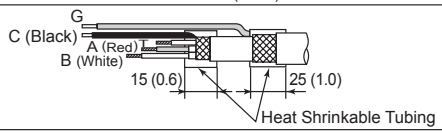
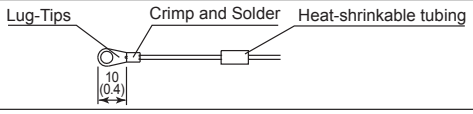
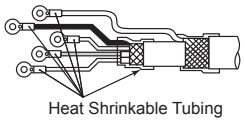
In case that the cable end finish parts assembly is necessary after delivery, contact your nearest Yokogawa sales office or the sales representative from which you purchased the product.

CAUTION

Do not touch the " conductive layer" (black area covering the signal cables A and B) to the converter case, terminal, and other leadwires. If it is touched, operation of the converter may be incorrect. When the cable is terminated, remove the conductive layer properly.

Figure 4.7 End Processing Method of DYC Signal Cable for Detector

4.5.2 For Vortex Flow Converter (DYA)

	Description	Figure
1	Strip off the outer polyethylene jacket, outer braided shield and inner jacket, and inner braided shield as per the dimensions as shown.	
2	Cut of the black conductive layers(convering the two wires) completely, as per the dimensions below. Twist each of the conductor and drain wires so that there are no free strands.	
3	Do not short-circuit the conductive layer and the terminals (A, B, C, G, and T*1).	
4	Strip off about 5 mm (0.2 in.) of insulation for each of wires A, B, and T*1, and twist the strands of each wire.	
5	Slide black FEP (fluorinated ethylene propylene) tubing over the inner shield drain wire C and blue FEP tubing over outer shield drain wire G until the tubing cannot be slid any further, and then cut off the tubing leaving 5 mm (0.2 in.) of the drain wires exposed.	
6	Slide heat shrinkable tubing over the cable end so that the tubing covers the braided shield and overlaps both the polyethylene jacket and loose wires A, B, C, G, and T*1.	
7	Slide a short piece of heat shrinkable tubing over each of wires A, B, C, G, and T*1. Install a crimp-on terminal lug at the tip of each wire. Crimp and solder each lug.	
8	Slide each short piece of heat shrinkable tubing over the crimp sleeve. Heat all pieces of heat shrinkable tubing with a heat blower or dryer.	
9	Attach an identification label to the end of the cable. **NOTE** Check that the insulation resistance between each wire including the inner shield is 10M or greater at 500V DC. Ensure that both ends of the wires are disconnected (open-circuited) during the check.	

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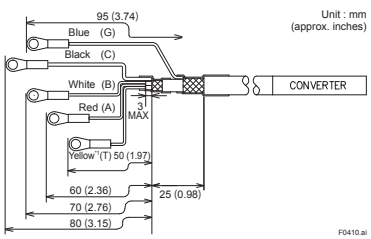
(*1): Only for /MV



NOTE

In case that the cable end finish parts assembly is necessary after delivery, contact your nearest Yokogawa sales office or the sales representative from which you purchased the product.

CAUTION

Do not touch the " conductive layer" (black area covering the signal cables A and B) to the converter case, terminal, and other leadwires. If it is touched, operation of the converter may be incorrect. When the cable is terminated, remove the conductive layer properly.

Figure 4.8 End Processing Method of DYC Signal Cable for Converter

4.6 Wiring Procedures and Precautions

NOTE

Once all wiring is complete, check the connections before applying power to the instrument. Improper arrangements or wiring may cause a unit malfunction or damage.

(1) Lay wiring as far as possible from electrical noise sources such as large capacity transformers, motors, and power supplies.

(2) Remove the terminal cover and dustproof plug of an electrical connection before wiring. When you open the cover of explosion proof type(*), turn the Locking Screw to the right, and unlock. When you close a cover after wiring, be sure to turn the Locking Screw to the left and lock.
(*) Flameproof(TIIS,ATEX,IECEx)

(3) It recommends using an flexible metal conduit and a duct for waterproofing or external protection of an electric wire. Refer to Figure 4.9 and Figure 4.10.

(4) The flameproof packing adapter (option code: /G11 or /G12) should be used for the external wiring of TIIS Flameproof. Refer to "INSTALLATION AND OPERATING PRECAUTIONS FOR TIIS FLAMEPROOF EQUIPMENT."

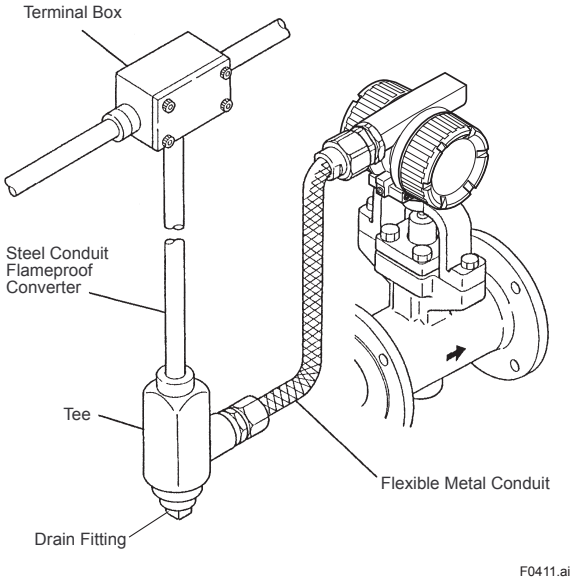


Figure 4.9 Example of Wiring (Integral Type and Remote Type Detector)

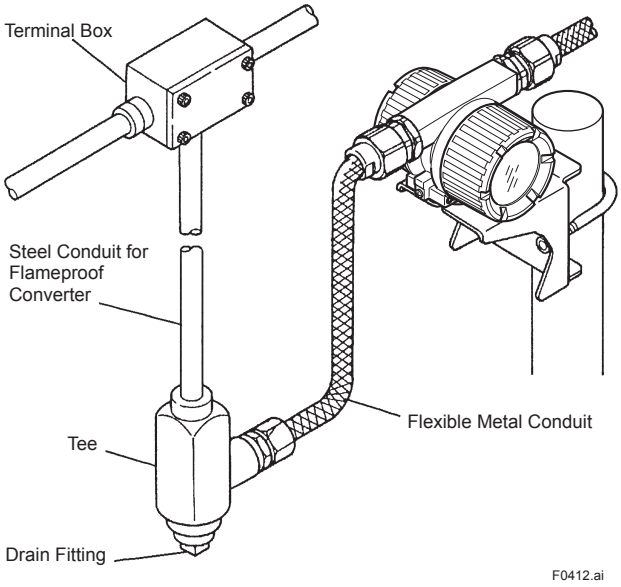


Figure 4.10 Example of Wiring (Remote Type Converter)

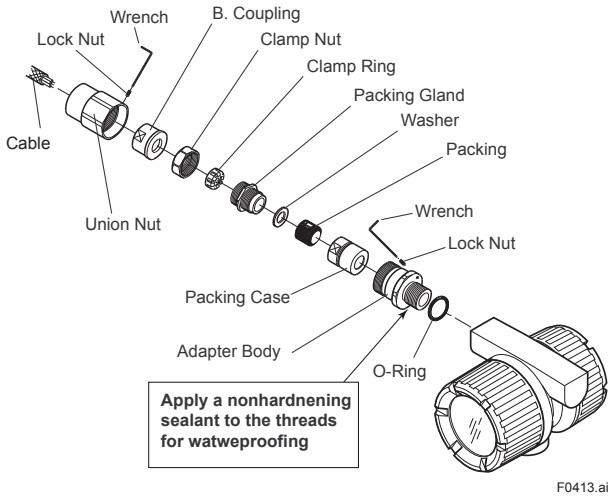


Figure 4.11 Cable Wiring

NOTE

Be sure to use the flameproof packing adapter (option code:/G11 or /G12) for TIIS flameproof type at the time of cable wiring work. Refer to Table 4.2.

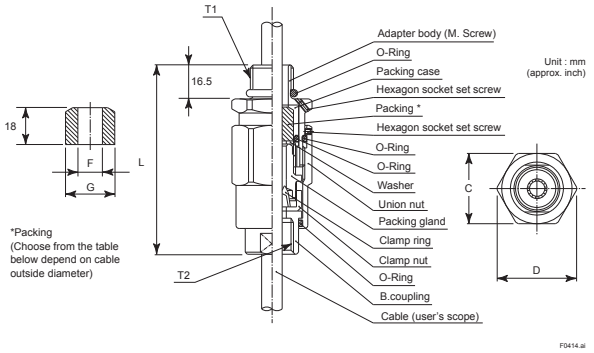
Table 4.2 Flameproof packing adaptor

Option Code	Diameter for screw	Cable outer diameter mm (inch)	Identification mark	Parts NO.
G11	G11	ø8.0 to ø10.0 (ø0.31 to ø0.39)	16 8-10	G9601AM
G12	G12	ø10.0 to ø12.0 (ø0.39 to ø0.47)	16 10-12	

(5) Perform attachment of flameproof packing adaptor in the following ways. Refer to Figure 4.11.
  (a) Loosen the locking screw and remove the terminal box cover.
  (b) Measure the cable outer diameter in two directions to within 0.1 mm.
  (c) Calculate the average of the two diameters, and use packing with an internal diameter nearest to this value. Refer to Table 4.2.
  (d) Screw the flameproof packing adapter into the terminal box until the O-Ring touches the wiring port (at least 6 full turns), and firmly tighten the lock nut.
  (e) Insert the cable through the union nut, the B. coupling, the clamp nut, the clamp ring, the packing gland, the washer, the packing, and the packing case, in that order.
  (f) Insert the end of the cable into the terminal box.
  (g) Tighten the union cover to grip the cable. When tightening the union cover, tighten approximately one turn past the point where the cable will no longer move up and down. Proper tightening is important. If it is too tight, a circuit break in the cable may occur; if not tight enough, the flameproof effectiveness will be compromised.
  (h) Fasten the cable by tightening the clamp nut.
  (i) Tighten the lock nut on the union nut.
  (j) Connect the cable wires to each terminal.

(6)
  (a) Do not connect cables outdoors in wet weather in order to prevent damage from condensation and to protect the insulation.
  (b) Do not splice the cable between the flowtube terminal and the converter if it is too short. Replace the short cable with a cable that is the appropriate length.
  (c) The signal cables must be routed in separate steel conduit tubes 16 (JIS C 8305) or flexible conduit tubes 15 (JIS C 8309).
  (d) Always route the power and output signal cables in separate steel conduit tubes, except when the power supply voltage is 24 V and four-core cables are used for wiring. Keep conduits or flexible tubes watertight using sealing tape.

(7) For the TIIS flameproof type with wiring using a flameproof packing adapter, wire cables through the packing adapters approved by Yokogawa (option code: /G11 or /G12).



Size					Cable outer diameter	Packing dimensions		Identification mark	Weight kg (lb)
T1	T2	C	D	L		F	G		
G 1/2	G 1/2	35 (1.38)	39 (1.54)	94.5 (3.72)	ø8.0 to ø10.0 (ø0.31 to ø0.39)	ø10.0 (ø0.39)	ø20.0 (ø0.79)	16 8-10	0.26 (0.57)
					ø10.0 to ø12.0 (ø0.39 to ø0.47)	ø12.0 (ø0.47)		16 10-12	

Figure 4.12 Flameproof Packing Adapter (option code: /G11, /G12)

4.7 Grounding

IMPORTANT

When a lightning protector (option code: /A) is selected, use a grounding resistance of 10Ω or less.

(1) The grounding terminals ⏚ are located on the inside and outside of the terminal area. Either terminal may be used.
(2) For pulse output version, ground the flowmeter. Also ground the shielded cable between the converter and the pulse receiver.
(3) Grounding should satisfy Class D requirements (ground resistance 100Ω or less).
(4) Use 600V PVC insulated wire for grounding.

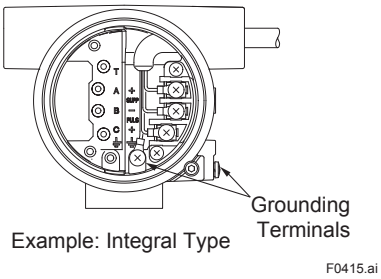


Figure 4.13 Grounding Terminal

5. BASIC OPERATING PROCEDURES

Data setting can be performed with the three keys on the front panel (SET,SHIFT and INC) or using a handheld BRAIN TERMINAL (BT200) and HART communicator.

5.1 Display Configuration

Figure 5.1 shows the configuration of the digitalYEWFLO display panel (if equipped).

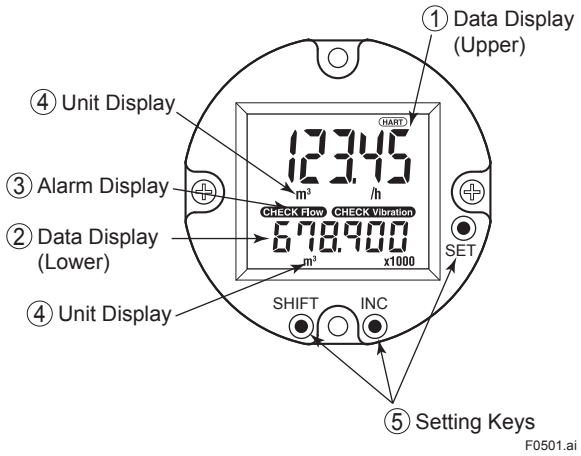


Figure 5.1 Display Configuration

① Data Display(Upper) : flowrate data, setting data, total data temperature data (/MV)
② Data Display(Lower) : total data, alarm data temperature data (/MV)
③ Alarm Display : alarm of a flow error and a vibration error
④ Unit Display : flowrate unit
⑤ Setting Keys : These keys are used to change flow rate data displays and type of setting data

5.2 Display Contents

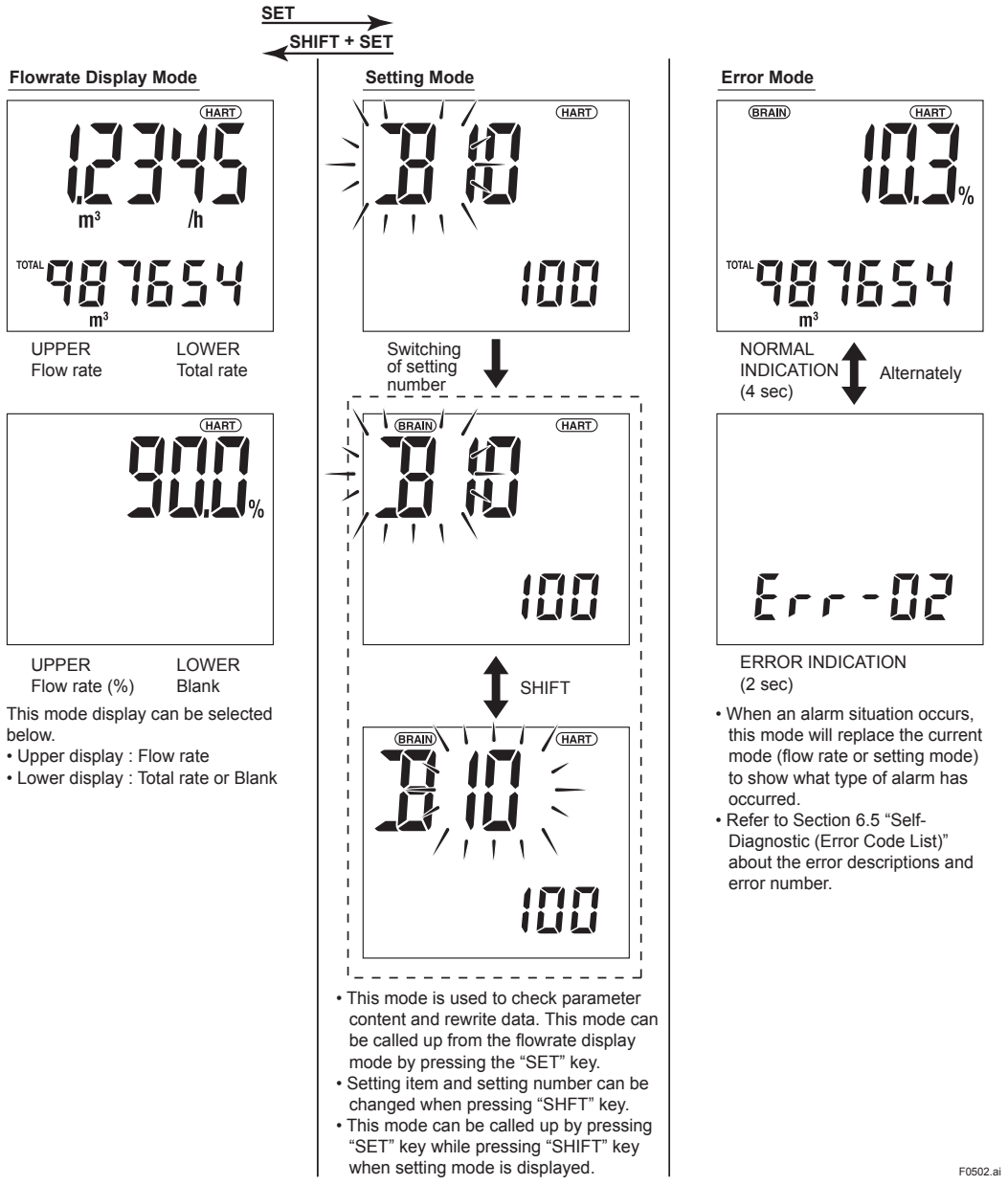
The display content items are classified in the following three items.

Table 5.1 Mode Name List

Mode (status) Name	Display Contents
Flow rate display mode	A mode in which instantaneous flow rates or totalized values are displayed. Display content is usually selected either in display content selection mode or by setting parameters via BRAIN communication.
Setting mode	In this mode, parameter contents are confirmed or data is updated using the setting section. The mode is changed to this mode when “SET” key is pressed in normal mode.
Alarm number display mode	This mode is overlapped when an alarm is occurring in display mode. The alarm number presentation to indicate alarm contents (about 2 sec) and the normal data display (about 4 sec) are repeated alternatively.

Mode represents that the system is in a state where the relevant setting or display is possible.

● Display Example


SET
SHIFT + SET
Flowrate Display Mode
Setting Mode
Error Mode
HART
BRAIN
12345
m³ /h
TOTAL 987654
m³
UPPER Flow rate
LOWER Total rate
90.0%
UPPER Flow rate (%)
LOWER Blank
This mode display can be selected below.
• Upper display : Flow rate
• Lower display : Total rate or Blank
Switching of setting number
100
SHIFT
• This mode is used to check parameter content and rewrite data. This mode can be called up from the flowrate display mode by pressing the “SET” key.
• Setting item and setting number can be changed when pressing “SHFT” key.
• This mode can be called up by pressing “SET” key while pressing “SHIFT” key when setting mode is displayed.
10.3%
NORMAL INDICATION (4 sec)
Alternately
Err-02
ERROR INDICATION (2 sec)
• When an alarm situation occurs, this mode will replace the current mode (flow rate or setting mode) to show what type of alarm has occurred.
• Refer to Section 6.5 “Self-Diagnostic (Error Code List)” about the error descriptions and error number.
F0502.ai

5.3 Display Mode

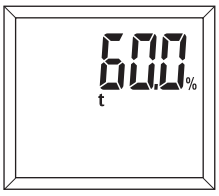
The display mode is a mode in which instantaneous flow rates or totalized flow are displayed. In display mode, there are three display modes as shown in Table 5.2.

Table 5.2 Display Mode

Name	Contents	Upper Display	Lower Display
% Display (Flow rate)	Instantaneous % flow rate is displayed.	○	×
Engineering Display Unit	Instantaneous flow rate in an engineering unit is displayed.	○	×
Totalized Display	Totalized flow displayed without indicating the decimal point.	×	○
% Display (Temperature) (*1)	Instantaneous temperature is displayed. In this case, “t” is displayed simultaneously (Refer to Figure 5.2).	○	×
Temperature display(*1)	Temperature value is displayed.	×	○
Blank	—	×	○

(*1) Only for /MV.

○: Displayed ×: Not displayed



F0503.ai

Figure 5.2 % Display (Temperature)

Display mode can be changed using the BT200 or the indicator setting section.

(1) For operation using BT200, perform changes using the parameter item “ B30:UPPER DISP” and “B31:LOWER DISP”.

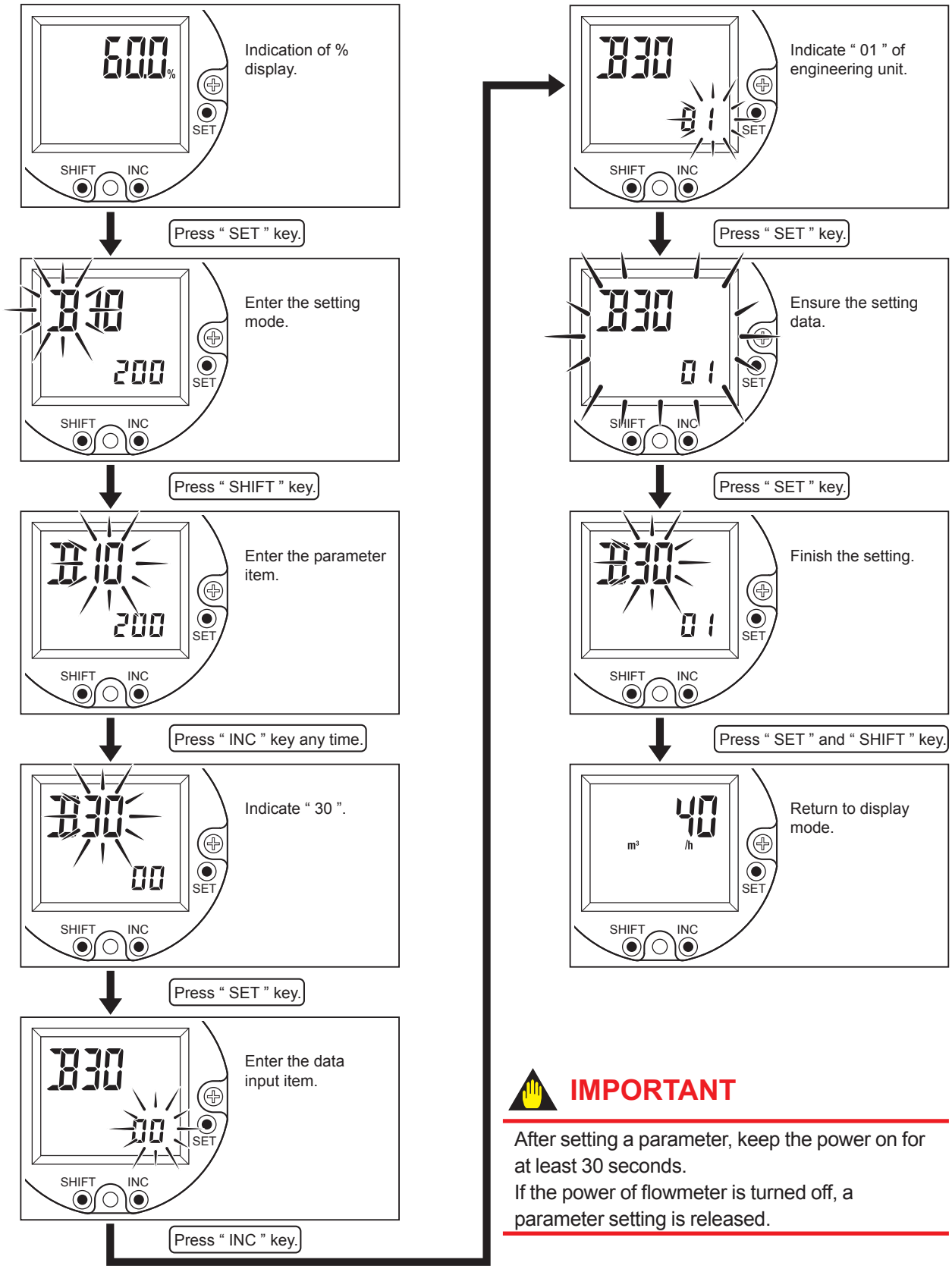
(2) For operation using indicator, change B30 and B31 parameter item number to display an appropriate display.

IMPORTANT

After setting a parameter, keep the power on for at least 30 seconds.
If the power of flowmeter is turned off, a parameter setting is released.

5.3.1 Changes to Engineering Display Unit from % Display

The display mode can be changed referring to Section 6.3 “Parameters List.”


Indication of % display.
SET
SHIFT
INC
Press “ SET ” key.
Enter the setting mode.
200
Press “ SHIFT ” key.
Enter the parameter item.
Press “ INC ” key any time.
Indicate “ 30 ”.
Press “ SET ” key.
Enter the data input item.
Press “ INC ” key.
Indicate “ 01 ” of engineering unit.
Press “ SET ” key.
Ensure the setting data.
Press “ SET ” key.
Finish the setting.
Press “ SET ” and “ SHIFT ” key.
Return to display mode.
m³
/h

IMPORTANT

After setting a parameter, keep the power on for at least 30 seconds.
If the power of flowmeter is turned off, a parameter setting is released.

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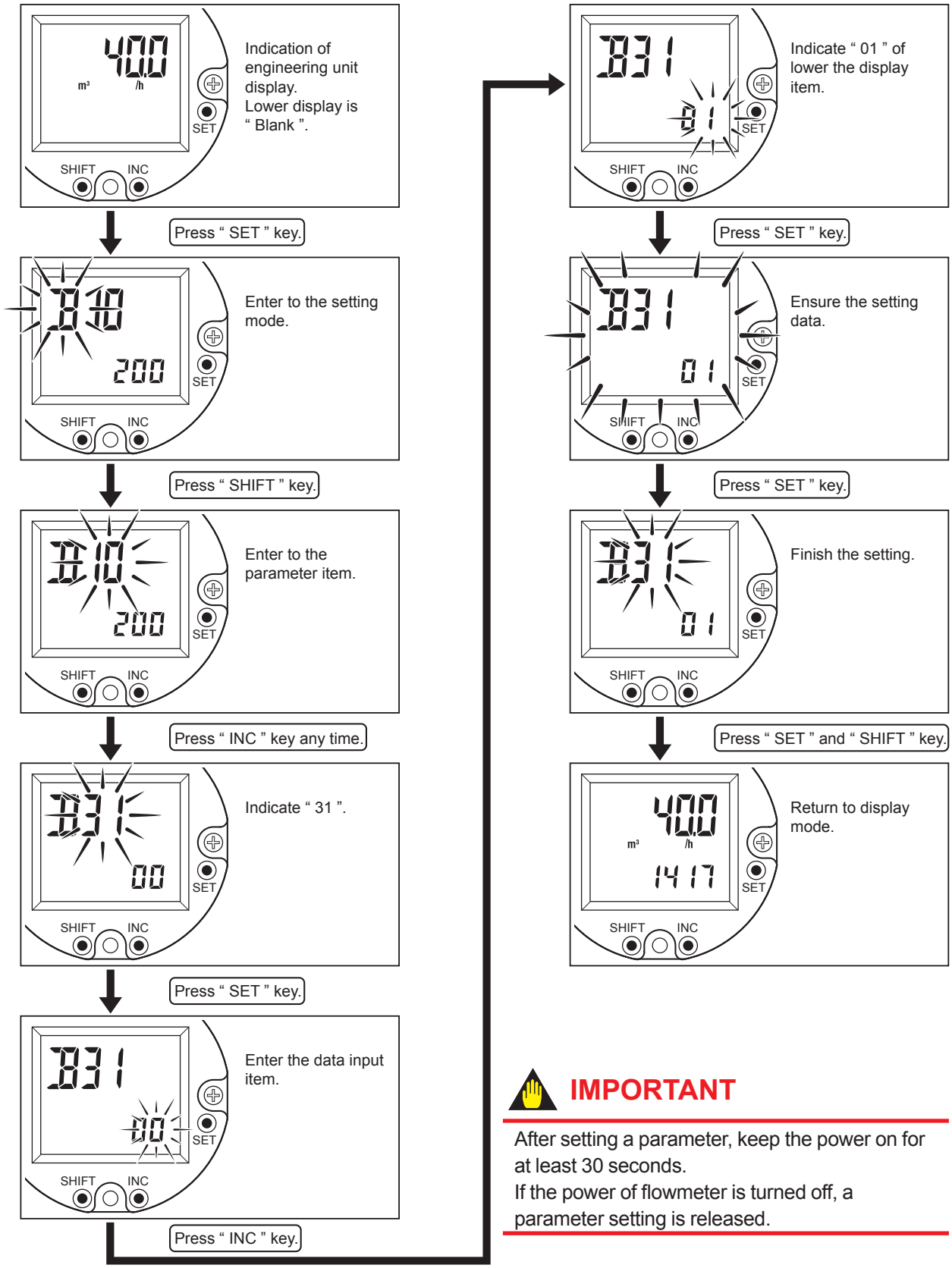
5.3.2 Indicate the Total Rate in the Data Display(Lower)

The display mode can be changed referring to Section 6.3 “Parameters List.”


Indication of engineering unit display. Lower display is “ Blank ”.
Press “ SET ” key.
Enter to the setting mode.
Press “ SHIFT ” key.
Enter to the parameter item.
Press “ INC ” key any time.
Indicate “ 31 ”.
Press “ SET ” key.
Enter the data input item.
Press “ INC ” key.
Indicate “ 01 ” of lower the display item.
Press “ SET ” key.
Ensure the setting data.
Press “ SET ” key.
Finish the setting.
Press “ SET ” and “ SHIFT ” key.
Return to display mode.
SET
SHIFT
INC

IMPORTANT

After setting a parameter, keep the power on for at least 30 seconds.
If the power of flowmeter is turned off, a parameter setting is released.

F0505.ai

5.4 Setting Mode

The setting mode is used for checking parameters and rewriting data. The following is an overview of the setting mode.

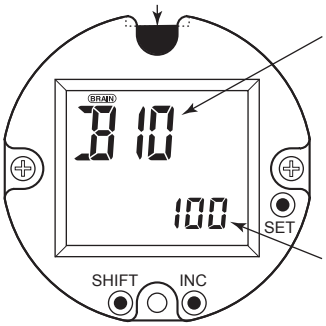
NOTE

- Refer to Section 6.3 “Parameters List” and Section 6.4 “Parameters Description” on how to change setting.

5.4.1 Display Configuration of Setting Mode

Simple parameter sheet

In this sheet, a setting flow chart and the parameter list required to operate digitalYEWFLO is indicated.



Item number
Change item number using “SHIFT” key and “INC”key.

Data number
Change the data number using “SHIFT” key and “INC” key.

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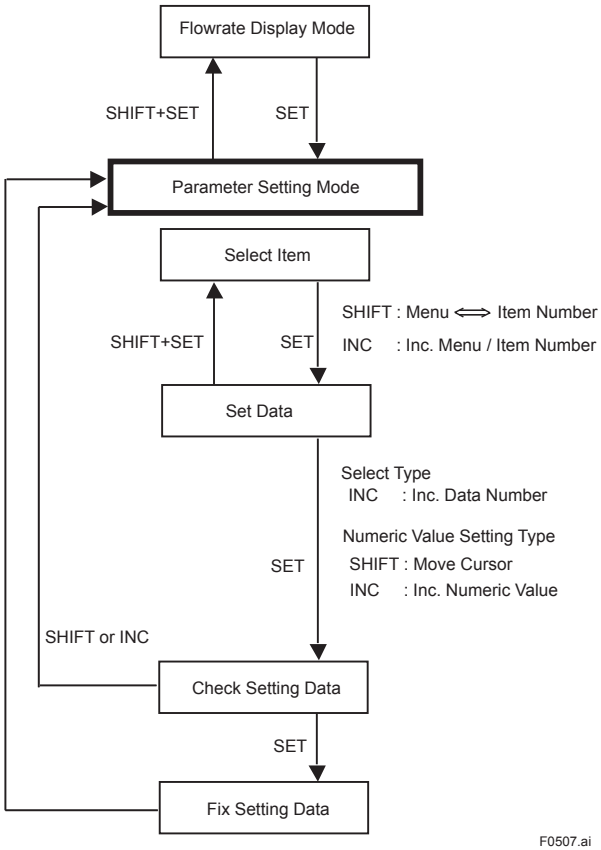


F0507.ai

Figure 5.3 Indicator Configuration and Parameter Setting Procedure

- When completing setting, press “SHIFT” key and “SET” key simultaneously. The mode move to the “display mode”.

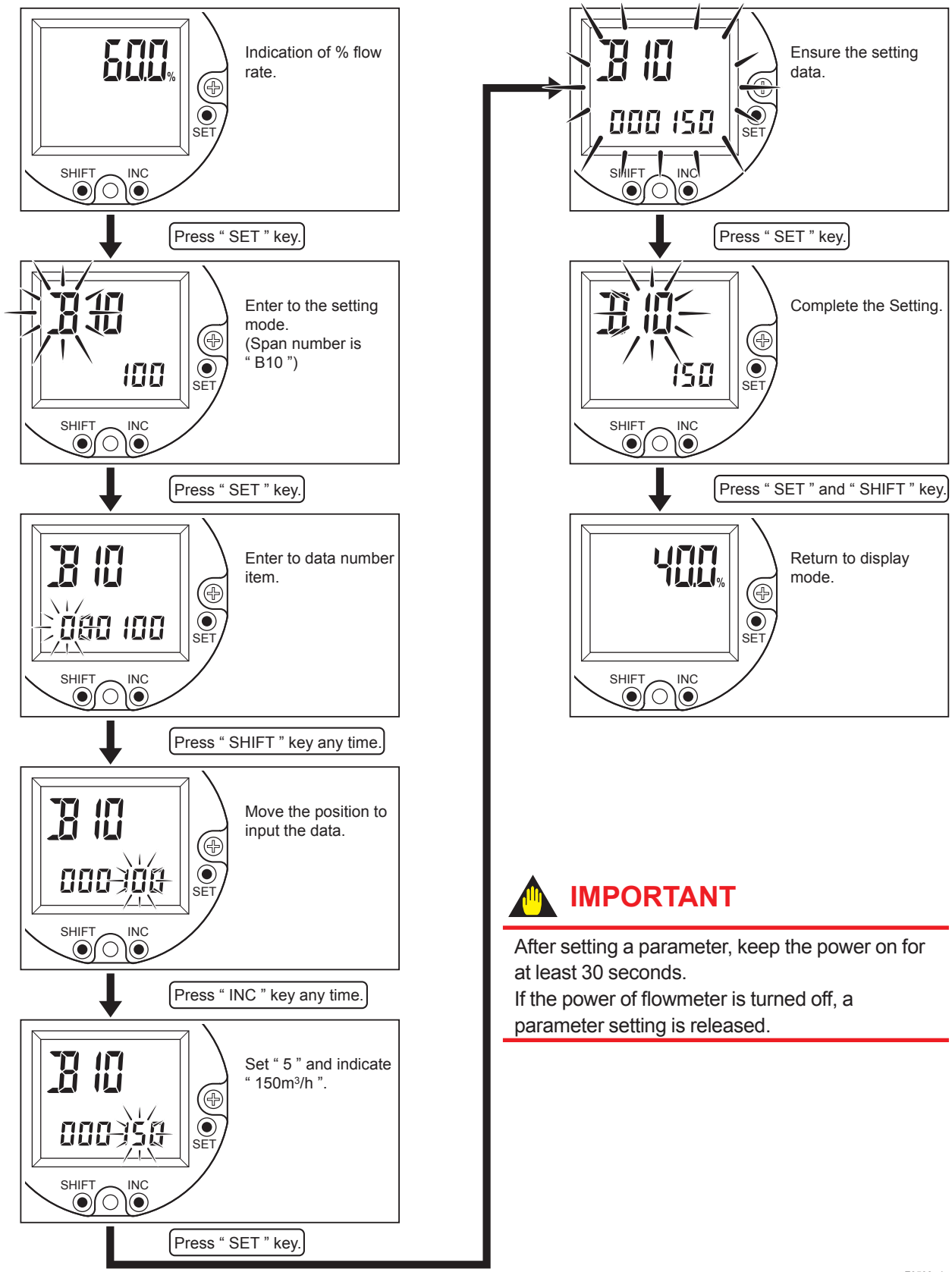
IMPORTANT

After setting a parameter, keep the power on for at least 30 seconds.
If the power of flowmeter is turned off, a parameter setting is released.

5.4.2 Data Setting Method

■ Input method of numeric data

Example 1: Change the span from 100m³/h to 150m³/h
The setting mode can be changed referring to Section 6.3 “Parameters List.”


Indication of % flow rate.
SET
SHIFT
INC
Press “ SET ” key.
Enter to the setting mode. (Span number is “ B10 ”)
Press “ SET ” key.
Enter to data number item.
Press “ SHIFT ” key any time.
Move the position to input the data.
Press “ INC ” key any time.
Set “ 5 ” and indicate “ 150m³/h ”.
Press “ SET ” key.
Ensure the setting data.
Press “ SET ” key.
Complete the Setting.
Press “ SET ” and “ SHIFT ” key.
Return to display mode.

IMPORTANT

After setting a parameter, keep the power on for at least 30 seconds.
If the power of flowmeter is turned off, a parameter setting is released.

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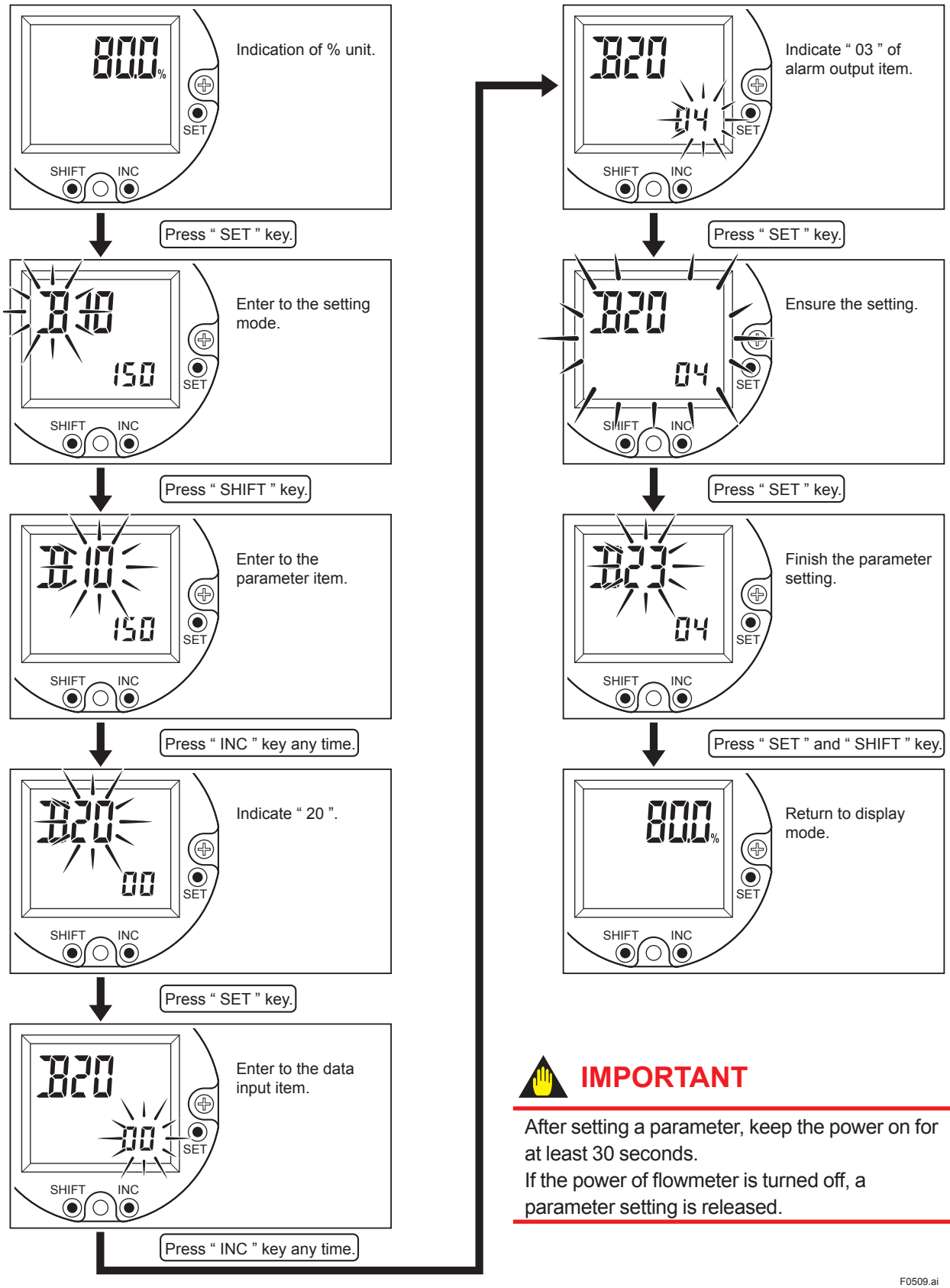
■ Input method of selection items

Example 2: Change the pulse output to alarm output.
The setting mode can be changed referring to Section 6.3 “Parameters List.”


Indication of % unit.
Press “ SET ” key.
Enter to the setting mode.
Press “ SHIFT ” key.
Enter to the parameter item.
Press “ INC ” key any time.
Indicate “ 20 ”.
Press “ SET ” key.
Enter to the data input item.
Press “ INC ” key any time.
Indicate “ 03 ” of alarm output item.
Press “ SET ” key.
Ensure the setting.
Press “ SET ” key.
Finish the parameter setting.
Press “ SET ” and “ SHIFT ” key.
Return to display mode.
SET
SHIFT
INC

IMPORTANT

After setting a parameter, keep the power on for at least 30 seconds.
If the power of flowmeter is turned off, a parameter setting is released.

F0509.ai

6. PARAMETERS

6.1 digitalYEWFLO Parameters

The parameters are set before factory shipment. Set the required parameter of changing fluid, contact out and indication of display.

6.2 Multi-Variable Type (/MV) Parameters

Parameter item F is indicated when /MV is selected. The parameters are set before factory shipment, but it is necessary to set the analog output of temperature, span of temperature output.

IMPORTANT

For the remote type, be sure to set the cable length (F52) for remote type converter (DYA), because of effect of the cable length.

6.3 Parameters List

This section describes the parameter of digitalYEWFLO.

- Contents of parameters list.

Item	Description
Item	Parameter item number.
Name	Parameter name.
R / W (Read and Write)	Indicates parameter attributes. R : Display only (writing is not permitted). W : Writing is permitted.
Data Range	Shows data setting ranges for numerical value entry. Shows data to be selected for data selection. ( ) in parentheses, data code is shown for the display.
Unit	Engineering unit.
Remark	Remarks such as a description of the contents are given.
Initial value	Indicates the initial set values.
Disp.	D : Display can set parameter.
U / D	L : Parameter can be set by UP LOAD and DOWN LOAD. (Check all parameters after setting by DOWN LOAD.)

(1) Item A : Indication

These items are for the indication of flowrate and total.

Item	Name	R / W	Data Range	Unit	Decimal Point	Remark	Initial Value	Disp.	U / D (*1)
A00	DISPLAY					Menu A (Display)			
A10	FLOW RATE (%)	R	0.0 to 110.0	%	1	Flow rate			
A20	FLOW RATE	R	0.0 to 65535	FU+C40	0 to 5	Flow rate (in engineering unit)			
A30	TOTAL	R	0 to 999999 (*2)	FU	0 to 5	Totalized value			
	(Indicate only for /MV and B50 : TEMP)								
A40	TEMP (%) (*1)	R	0.0 to 110.0	%	1	Temperature Values (%)			
	(Indicate only for /MV)								
A41	TEMPERATURE (*1)	R	–999.9 to 999.9	D20	1	Temperature Values			
A60	SELF CHECK	R	GOOD ERROR			Self-diagnostic message			

FU : Flow unit
/MV: Multi-Variable (Build-in Temperature Sensor) Type
(*1) : Available for 3.10 or greater version that can be checked in K50.
(*2) : There will be linked to the value of B45, it is displayed “E” shows multipiler 10.

(2) Item B : Easy Setting

These items are for the principal items to operate digitalYEWFLO.
A value in “( )” is the data corresponding to the indicator.

Item	Name	R / W	Data Range	Unit	Decimal Point	Remark	Initial Value	Disp.	U / D (*1)
B00	EASY SETUP					Menu B			
B10	FLOW SPAN	W	0.00001 to 32000	FU + C40	0 to 5	Flow Span	10	D	L
B15	DAMPING	W	0 to 99	sec	0	Damping Time	4	D	L
B20	CONTACT OUT	W	OFF (0) SCALED PULSE (1) UNSCALED PULSE (2) FREQUENCY (3) ALARM (4) FLOW SW(LOW:ON) (5) FLOW SW(LOW:OFF) (6)			Contact Output Type	(0)	D	L
	(Indicate and Set only for B20: SCALED PULSE, UNSCALED PULSE)								
B21	PULSE RATE	W	0.00001 to 32000	FU / P	0 to 5	Pulse Output Rate	1.0 (*3)	D	L
	(Indicate and Set only for B20: FREQUENCY)								
B22	FREQ AT 100%	W	0 to 10000	PPS	0	Pulse Output Rate at sec /100%	1000	D	L
	(Indicate and Set only for B20: FLOW SW (ON), FLOW SW (OFF))								
B23	SET LEVEL	W	0.00001 to 32000	FU +C40	0 to 5	Flow Switch (Actual Flow rate)	0	D	L
B30	UPPER DISP	W	FLOW RATE (%) (0) FLOW RATE (1) TEMP (%) (2)			Selection of Upper Display (only for /MV)	(0) (*3)	D	L
B31	LOWER DISP	W	BLANK (0) TOTAL (1) TEMP (2)			Selection of Lower Display (only for /MV)	(0)	D	L
B40	TOTAL START	W	STOP (0) START (1)			Start / Stop of Totalizer	(0)	D	L
B45	TOTAL RATE	W	0.00001 to 32000 (0)	FU / P	0 to 5	Total Rate	1.0 (*3)	D	L
B47	TOTAL RESET	W	NOT EXECUTE (0) EXECUTE (1)			Totalizer Reset	(0)	D	L
	(Indicate and Set only for /MV)								
B50	A / OUT SELECT	W	FLOW (0) TEMP (1)			Selection of Analog Output	(0)	D	L
	(Indicate and Set only for /MV and B50: TEMP)								
B51	TEMP 0%	W	-999.9 to 999.9	D20	1	Set Temperature Value at 0%	-40	D	L
B52	TEMP 100%	W	-999.9 to 999.9	D20	1	Set Temperature Value at 100%	250 (*2)	D	L
B60	SELF CHECK	R	GOOD ERROR			Self-diagnostic message			

FU : Flow unit
(*1) : Available for 3.10 or greater version that can be checked in K50.
(*2) : If 7.00 or less version that can be checked in K50, Initial Value is 260.

(3) Item C : BASIC SETUP

These items are for the basic parameters with setting before shipment.
The parameters, C20 to C50, are not indicated when option code "/MV" is selected and parameter item is selected in F10 except "Monitor only" or "Not use".
A value in "( )" is the data corresponding to the indicator.

Item	Name	R / W	Data Range	Unit	Decimal Point	Remark	Initial Value	Disp.	U / D (*1)
C00	BASIC SETUP								
C10	TAG NO.	W	16 characters			Tag Number	(*2)		
C20	FLUID	W	LIQUID:Volume (0) GAS/STEAM:Volume (1) LIQUID:Mass (2) GAS/STEAM:Mass (3) GAS:STD/Normal (4)			Selection of FLUID type	(0) (*2)	D	L
	(Indicate and Set only for C20 : LIQUID : Volume, GAS / STEAM: Volume)								
C22	VOLUME UNIT	W	m^3 (0) k m^3 (1) l (2) cf (3) m cf (4) k cf (5) USgal (6) k USgal (7) UKgal (8) k UKgal (9) bbl (10) m bbl (11) k bbl (12)			Selection of Flow Units for Flow Rate	(0)(*2)	D	L
	(Indicate and Set only for C20 : LIQUID : Mass, GAS / STEAM : Mass)								
C25	DENSITY UNIT	W	kg/m^3 (0) lb/cf (1) lb/USgal (2) lb/UKgal (3)			Selection of Density Unit	(0)(*2)	D	L
C26	DENSITY f	W	0.00001 to 32000	C25	0 to 5	Operating Density (Manual Setting Value)	1024(*2)	D	L
C27	MASS UNIT	W	kg (0) t (1) lb (2) k lb (3)			Selection of Mass Flow Unit	(0) (*2)	D	L
	(Indicate and Set only for C20 : GAS : STD / Normal)								
C30	TEMP UNIT	W	deg C (0) deg F (1)			Selection of Temperature Unit	(0) (*2)	D	L
C31	TEMP f	W	-999.9 to 999.9	C30	1	Operating Temperature (Manual Setting Value)	15.0 (*2)	D	L
C32	TEMP b	W	-999.9 to 999.9	C30	1	Standard / Normal Temperature	15.0 (*2)	D	L
C33	PRESS UNIT	W	MPa abs (0) kPa abs (1) bar abs (2) kg/cm^2 a (3) psia (4)			Selection of Pressure Unit	(0) (*2)	D	L
C34	PRESS f	W	0.00001 to 32000	C33	0 to 5	Absolute Pressure at Operating Condition (Manual Setting Value)	0.1013 (*2)	D	L
C35	PRESS b	W	0.00001 to 32000	C33	0 to 5	Absolute Pressure at Standard Condition	0.1013 (*2)	D	L
C36	DEVIATION	W	0.001 to 10.0		3	Deviation Factor	1.0 (*2)	D	L

Item	Name	R / W	Data Range	Unit	Decimal Point	Remark	Initial Value	Disp.	U / D (*1)
C37	STD/NOR UNIT	W	Nm^3 (0) k Nm^3 (1) M Nm^3 (2) Nl (3) Sm^3 (4) k Sm^3 (5) M Sm^3 (6) Sl (7) scf (8) k scf (9) M scf (10)			Selection of Volumetric Unit at Normal Condition N: Normal S: Standard	(0) (*2)	D	L
C40	TIME UNIT	W	/s (0) /m (1) /h (2) /d (3)			Selection of Time Unit	(2) (*2)	D	L
C45	FLOW SPAN	W	0.00001 to 32000	FU+C40	0 to 5	Flow Span	10 (*2)	D	L
C50	DAMPING	W	0 to 99	sec	0	Damping Time	4	D	L
C60	SELF CHECK	R	GOOD ERROR			Self-diagnostic message			

FU : Flow unit
(*1) : Available for 3.10 or greater version that can be checked in K50.
(*2) : If specified when ordering, it is set to the specified contents.

(4) Item D : Additional Setup

These items are for Auxiliary Setup.
A value in "( )" is the data corresponding to the indicator.

Item	Name	R / W	Data Range	Unit	Decimal Point	Remark	Initial Value	Disp.	U / D (*1)
D00	AUX. SETUP					Menu D (Additinal Setup)			
D10	LOW CUT	W	* to 32000	FU + C40	0 to 5	Low Cut Flow rate *Minimum Flow rate / 2	0.47	D	
D20	TEMP UNIT	W	deg C (0) deg F (1)			Selection of Temperature Unit	(0) (*2)	D	L
D21	TEMP f	W	-999.9 to 999.9	D20	1	Operating Temperature (Manual Setting Value)	15.0 (*2)	D	L
D25	DENSITY UNIT	W	kg/m^3 (0) lb/cf (1) lb/USgal (2) lb/UKgal (3)			Selection of Density Unit	(0) (*2)	D	L
D26	DENSITY f	W	0.00001 to 32000	D25	0 to 5	Operating Density (Manual Setting Value)	1024 (*2)	D	L
D30	OUT LIMIT (H)	W	100.0 to 110.0	%	1	Upper Limit Value	110.0	D	L
D35	BURN OUT	R	High (0) Low (1)			Output Direction at Burn Out	(0)	D	L
D40	SPECIAL UNIT		No (0) Yes (1) Special (2)			Selection of change for Special Flow Unit	(0)	D	L
	(Indicate and Set only for D40: Yes, Special)								
D41	BASE UNIT	R	m^3 (0) k m^3 (1) l (2) cf (3) m cf (4) k cf (5) USgal (6) kUSgal (7) UKgal (8) kUKgal (9) bbl (10) m bbl (11) k bbl (12) kg (13) t (14) lb (15) k lb (16) Nm^3 (17) k Nm^3 (18) M Nm^3 (19) Nl (20) Sm^3 (21) k Sm^3 (22) M Sm^3 (23) Sl (24) scf (25) k scf (26) M scf (27)			Basic unit for conversion to special unit N: Normal S: Standard		D	
	(Indicate and Set only for D40: Yes, Special)								
D42	USER'S UNIT	W	8 characters			User's unit (*3)			L
	(Indicate and Set only for D40: Yes, Special)								
D43	CONV FACTOR	W	0.00001 to 32000		0 to 5	Conversion factor	1.0	D	L
D60	SELF CHECK	R	GOOD ERROR			Self-diagnostic message			

FU : Flow unit
(*1) : Available for 3.10 or greater version that can be checked in K50.
(*2) : If specified when ordering, it is set to the specified contents.
(*3) : Available characters are same as C10.
Refer to Section 6.4 "Parameters Description."

(5) Item E : Detector Setup

These items are for detector that has been already set before.

A value in "( )" is the data corresponding to the indicator.

Item	Name	R / W	Data Range	Unit	Decimal Point	Remark	Initial Value	Disp.	U / D (*1)
E00	METER SETUP					Menu E (Detector setup)			
E10	NOMINAL SIZE	W	15mm (0) 25mm (1) 40mm (2) 50mm (3) 80mm (4) 100mm (5) 150mm (6) 200mm (7) 250mm (8) 300mm (9) 400mm (10)			Selection of Nominal Size	(1) (*2)	D	L
E20	BODY TYPE	W	Standard (0) High Pressure (1) Low Flow Unit (1) (2) Low Flow Unit (2) (3)			Selection of Body Type	(0)	D	L
E30	SENSOR TYPE	W	Standard (0) High Temperature (1) Low Temperature (2)			Selection of Sensor Type	(0)	D	L
E40	K-FACT UNIT	W	P/I (0) P/USgal (1) P/UKgal (2)			Selection of K-factor Unit	(0)	D	L
E41	K-FACTOR	W	0.00001 to 32000	E40	0 to 5	K-factor value of 15 deg C	68.6	D	
E50	DETECTOR No.	W	16 characters			Detector number			
E60	SELF CHECK	R	GOOD ERROR			Self-diagnostic message			

FU : Flow unit
(*1) : Available for 3.10 or greater version that can be checked in K50.
(*2) : If specified when ordering, it is set to the specified contents.

(6) Item F: Thermometer (Only for Multi-Variable Type)

These items is for thermometer setting when.
A Value in "( )" is the data corresponding to the indicator.

Item	Name	R / W	Data Range	Unit	Decimal Point	Remark	Initial Value	Disp.	U / D (*1)
F00	THERMOMETER					Menu F (Thermometer function)			
F10	Function	W	Monitor only (0) Saturated Steam (1) Superheat Steam (2) GAS: STD/Normal (3) LIQUID: Mass (4) Not use (5)			Select thermometer function. (Move to F40 when "Monitor only" is selected) (Move to F60 when "Not Use" is selected)	(0)	D	L
	(Indicate and Set only for F10: Saturated Steam)								
F12	MASS UNIT	W	kg (0) t (1) lb (2) k lb (3)			Selection of mass flow rate unit	(0)	D	L
	(Indicate and Set only for F10: Superheat Steam)								
F14	PRSS UNIT	W	MPa abs (0) kPa abs (1) bar abs (2) kg/cm^2 a (3) psia (4)			Selection of pressure unit	(0)	D	L
F15	PRESS f	W	0.00001 to 32000	F14	0 to 5	Absolute pressure at operating condition(Manual setting vaiue)	0.1013		
F16	MASS UNIT	W	kg (0) t (1) lb (2) k lb (3)			Selection of mass flow rate unit	(0)	D	L
	(Indicate and Set only for F10: GAS: STD/Normal)								
F18	TEMP UNIT	W	deg C (0) deg F (1)			Selection of temperature unit	(0)	D	L
F19	TEMP b	W	-999.9 to 999.9	F18	1	Standard/Normal temperature	15.0	D	L
F20	PRESS UNIT	W	MPa abs (0) kPa abs (1) bar abs (2) kg/cm^2 a (3) psia (4)			Selection of temperture unit	(0)	D	L
F21	PRESS f	W	0.00001 to 32000	F20	0 to 5	Absolute pressure at operating condition(Manual setting value)	0.1013	D	L
F22	PRESS b	W	0.00001 to 32000	F20	0 to 5	Absolute pressure at Standard condition	0.1013	D	L
F23	DEVIATION	W	0.001 to 10.000		3	Deviation factor	1.0	D	L
F24	STD/NOR UNIT	W	Nm^3 (0) k Nm^3 (1) M Nm^3 (2) Nl (3) Sm^3 (4) k Sm^3 (5) M Sm^3 (6) Sl (7) scf (8) k scf (9) M scf (10)			Selection of volumetric unit at normal condition N: Normal S: Standard	(0)	D	L
	(Indicate and Set only for F10: LIQUID: Mass)								
F26	DENSITY UNIT	W	kg/m^3 (0) lb/cf (1) lb/USgal (2) lb/UKgal (3)			Selection of density unit	(0)	D	L
F27	DENSITY b	W	0.00001 to 32000	F26	0 to 5	Density of standard condition	1.0	D	L
F28	TEMP UNIT	W	deg C (0) deg F (1)			Selection of temperature unit	(0)	D	L

Item	Name	R / W	Data Range	Unit	Decimal Point	Remark	Initial Value	Disp.	U / D (*1)
F29	TEMP b	W	-999.9 to 999.9	F28	1	Temperature of standard condition	15.0	D	L
F30	1st coef	W	-32000 to 32000	1/F28	0 to 5	1st temperature coefficient	1.0	D	L
F31	2nd coef	W	-32000 to 32000	$1/F28^2$	0 to 5	2nd temperature coefficient	1.0	D	L
F32	MASS UNIT	W	kg (0) t (1) lb (2) k lb (3)			Selection of mass flow rate unit	(0)	D	L
F35	TIME UNIT	W	/s (0) /m (1) /h (2) /d (3)			Selection of time unit	1	D	L
F40	FLOW SPAN	W	0.00001 to 32000	FU+35	0 to 5	Flow span	0.5	D	L
F45	DAMPING	W	0 to 99	sec	0	Damping	4	D	L
F50	TEMP DAMPING	W	0 to 99	sec	0	Damping for temperture output	4	D	L
F52	CABLE LENGTH	W	0 to 30	m	0	Cable length for signal cable (0m in case of integral version)	0	D	L
F55	A/OUT SELECT	W	FLOW (0) TEMP (1)			Selection of analog output	(0)	D	L
	(Indicate and Set only for F55: TEMP)								
F56	TEMP 0%	W	-999.9 to 999.9	D20	1	Temperture value at 0%	-40	D	L
F57	TEMP 100%	W	-999.9 to 999.9	D20	1	Temperture value at 100%	250 (*2)	D	L
F58	TEMP ERR OUT	W	0% (0) OUT LIMIT(H) (1) TEMP f (2)			Selection of themometer error output when “F55: TEMP” is selected (A value of OUT LIMIT(H) depend on D30)	1	D	L
F60	SELF CHECK	R	GOOD ERROR			Self-diagnostic message			

(*1) : Available for 3.10 or greater version that can be checked in K50.
(*2) : If 7.00 or less version that can be checked in K50, Initial Value is 260.

(7) Item H : Adjust.

These items are for setting of adjustment.

A value in "( )" is the data corresponding to the indicator.

Item	Name	R / W	Data Range	Unit	Decimal Point	Remark	Initial Value	Disp.	U / D (*1)
H00	ADJUST					Menu H (Adjust)			
H10	TRIM 4mA	W	-1.00 to 1.00	%	2	Trimming 4mA	0.0	D	
H11	TRIM 20mA	W	-1.00 to 1.00	%	2	Trimming 20mA	0.0	D	
H20	USER ADJUST	W	0.00001 to 32000		0 to 5	User Adjust	1.0	D	
H25	REYNOLDS ADJ	W	NOT ACTIVE (0) ACTIVE (1)			Reynolds Coefficient	(0)	D	
	(Indicate and Set only for H25: ACTIVE)								
H26	DENSITY f	W	0.00001 to 32000	D25	0 to 5	Density at operating condition	1024	D	
H27	VISCOSITY	W	0.00001 to 32000	mPa.s	0 to 5	Viscosity factor	1.0	D	
H30	EXPANSION FA	W	NOT ACTIVE (0) ACTIVE (1)			Expansion correction for compressible Gas	(0)	D	
H40	FLOW ADJUST	W	NOT ACTIVE (0) ACTIVE (1)			Instrumental Error Adjust	(0)	D	
	(Indicator and Set only for H40: ACTIVE)								
H41	FREQUENCY 1	W	0 to 32000	Hz	0 to 5	First break-point frequency (f1)	0.0	D	
H42	DATA 1	W	-50.00 to 50.00	%	2	First correcting value (d1)	0.0	D	
H43	FREQUENCY 2	W	0 to 32000	Hz	0 to 5	Second break-point frequency (f2)	0.0	D	
H44	DATA 2	W	-50.00 to 50.00	%	2	Second correcting value (d2)	0.0	D	
H45	FREQUENCY 3	W	0 to 32000	Hz	0 to 5	Third break-point frequency (f3)	0.0	D	
H46	DATA 3	W	-50.00 to 50.00	%	2	Third correcting value (d3)	0.0	D	
H47	FREQUENCY 4	W	0 to 32000	Hz	0 to 5	Fourth break-point frequency (f4)	0.0	D	
H48	DATA 4	W	-50.00 to 50.00	%	2	Fourth correcting value (d4)	0.0	D	
H49	FREQUENCY 5	W	0 to 32000	Hz	0 to 5	Fifth break-point frequency (f5)	0.0	D	
H50	DATA 5	W	-50.00 to 50.00	%	2	Fifth correcting value (d5)	0.0	D	
H60	SELF CHECK	R	GOOD ERROR			Self-diagnostic message			

(*1) : Available for 3.10 or greater version that can be checked in K50.

(8) Item J : Test

These items are for test of output.

A value in "( )" is the data corresponding to the indicator.

Item	Name	R / W	Data Range	Unit	Decimal Point	Remark	Initial Value	Disp.	U / D (*1)
J00	TEST					Menu J (Test)			
J10	OUT ANALOG	W	0.0 to 110.0	%	1	Current Output	0.0	D	
J20	OUT PULSE	W	0 to 10000	PPS	0	Pulse Output	0	D	
J30	OUT STATUS	W	OFF (0) ON (1)			Status Output	(0)	D	
J40 (*2)	RELEASE TIME	W	10min (0) 30min (1) 60min (2) 3h (3) 6h (4) 12h (5)			Test auto release time	0	D	
J60	SELF CHECK	R	GOOD ERROR			Self-diagnostic message			

(*1) : Available for 3.10 or greater version that can be checked in K50.
(*2) : Available for 7.00 or greater version that can be checked in K50.

(9) Item K : Maintenance

These items are for maintenance.

Item	Name	R / W	Data Range	Unit	Decimal Point	Remark	Initial Value	Disp.	U / D (*1)
K00	MAINTENANCE					Menu K (Maintenance)			
K10	TLA	W	0.1 to 20.0		1	Trigger Level Adjust	1.0	D	
K20	SIGNAL LEVEL	W	0.1 to 20.0		1	Signal Level	1.0	D	
K25	N.B. MODE	W	AUTO (0) MANUAL (1) TUNING AT ZERO (2)			Selection of Noise balance Mode	(0)	D	
K26	NOISE RATIO	R / W	0.00 to 2.00		2			D	
K28	SET VORTEX F	W	0 to 10000	Hz	0 to 5	Output test by setting simulated frequency.(*2)		D	
K30	VELOCITY	R		m/s	2	Velocity		D	
K32	SPAN V	R		Hz	2	Span velocity		D	
K34	VORTEX FREQ.	R		Hz	0 to 5	Vortex frequency		D	
K36	SPAN F	R			0 to 5	Span frequency		D	
	(Indicate only for F10: Saturated Steam, Superheat Steam, LIQUID: Mass)(*1)								
K38	DENSITY	R	0.00001 to 32000	D25	0 to 5	Density value (Calculated by Thermometer)		D	
K40	ERROR RECORD	R				Error Records			
K45	H VIBRATION	W	0% (0) NO ACTION (1)			Selection of Output Function when “High Vibration” error is indicated.	(1) (*3)		
K50	SOFTWARE REV	R	0.01 to 99.99		2	Software Revision Number			
K60	SELF CHECK	R	GOOD ERROR			Self-diagnostic message			

/MV : Multi-Variable (Build-in Temperature Sensor) Type
(*1) : Available for 3.10 or greater version that can be checked in K50.
(*2) : Available for 5.10 or greater version that can be checked in K50.
(*3) : If 7.00 or less version that can be checked in K50, Initial Value is 0.

(10) Item M : Memo

These items are for Memorandum.

Item	Name	R / W	Data Range	Unit	Decimal Point	Remark	Initial Value	Disp.	U / D (*1)
M00	MEMO					Menu M (Memo)			
M10	MEMO 1	W	16 characters	W		Memorandum 1 (*2)			
M20	MEMO 2	W	16 characters	W		Memorandum 2 (*2)			
M30	MEMO 3	W	16 characters	W		Memorandum 3 (*2)			
M60	SELF CHECK	R	GOOD ERROR	R		Self-diagnostic message			

(*1) : Available for 3.10 or greater version that can be checked in K50.
(*2) : Available characters are same as C10.
Refer to Section 6.4 “Parameters Description.”

6.4 Parameters Description

(1) Item A : Display

These items are for the indication of flowrate and total.

[A10:FLOW RATE(%)] Flow rate

Flowrate is displayed by "%" to span value.

[A20:FLOW RATE] Flow rate (Engineering unit)

Flowrate is displayed by engineering unit.

[A30:TOTAL] Total value

Total value of flowrate is displayed

Note: There will be linked to the value of B45 TOTAL RATE, it is displayed "E" shows multipiler 10.

Example

B45	A30
10000 (= 10^4)	999999E4
10 (= 10^1)	999999E1
0.00001	9.99999

The following item should be done in case of which Option code /MV is selected and analog output is "Temperature".

[A40:TEMP(%)] Temperature value

The measured temperature value is displayed by "%" to span value of temperature.

The following item should be done in case of which Option code /MV is selected.

[A41:TEMPERATURE] Temperature value

The measured temperature value is displayed by engineering unit.

(2) Item B : Easy Setting

These items are for the Principal items to operate digitalYEWFLO.
A value in "( )" is the data corresponding to indicator.

[B10:FLOW SPAN] Flowrate span

Set the required span with a numerical.

NOTE

The range of measurable flow velocity is as described in Table 13.6

[B15:DAMPING] Damping time constant

Set damping time constant values from 0s to 99sec.

[B20:CONTACT OUT] Contact output

Select contact output.

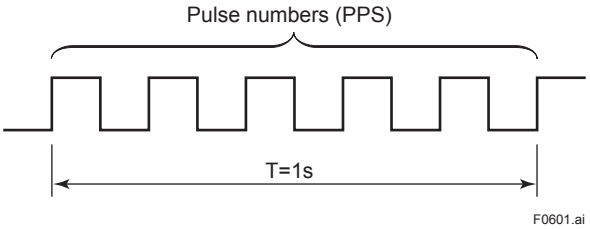
Item		Description
OFF	(0)	————————
SCALED PULSE	(1)	Scaled pulse output: Refer to "B21"
UNSCALED PULSE	(2)	Unscaled pulse output: Refer to "B21"
FREQUENCY	(3)	Frequency output: Refer to "B22"
ALARM	(4)	Alarm output: The status goes from close to open (OFF) during alarming. Refer to Section 6.5 "Self-Diagnostic (Error Code List)".
FLOW SW (LOW:ON)	(5)	Status output: Refer to "B23"
FLOW SW (LOW:OFF)	(6)	Status output: Refer to "B23"

[B21:PULSE RATE] Pulse output rate

Set output rate in a selection of SCALED PULSE or UNSCALED PULSE.
SCALED PULSE OUTPUT:
When SCALED PULSE is selected in B20, set flowrate per one pulse output. Rate unit is linking to the flow unit.
UNSCALED PULSE OUTPUT:
When UNSCALED PULSE is selected in B20, it outputs the pulse calculated by following formula.
The formula for output pulse number is as follows.
Output pulse number per one second = vortex number per one second / PULSE RATE set number.
Refer to Subsection 10.1.5 "Setting of Pulse Output (Scaling)".

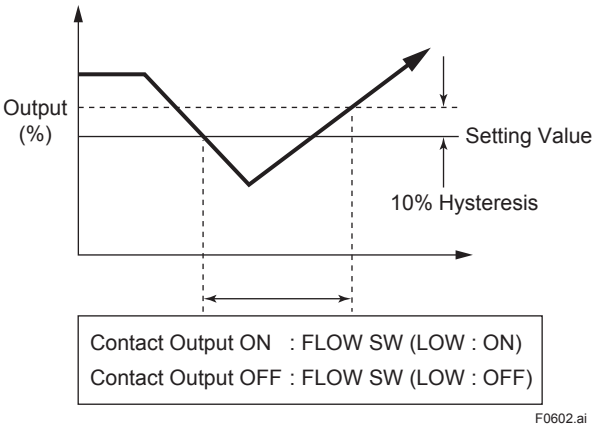
[B22:FREQ AT 100%] Pulse numbers of 100% at one second

Set pulse number at 100% for one second when "FREQUENCY" in B20 is selected.



[B23:SET LEVEL] Level of flow switch

Set level of flow switch when "FLOW SW" in B20 is selected. The contact output is sent out when the flowrate is less than the set comparison level.



[B30:UPPER DISP] Upper indicator display

Select upper display, Flow rate (%) (0), Flowrate (1), TEMP(%)(2). "TEMP(%)" can be selected when Option Code /MV.

[B31:LOWER DISP] Lower indicator display

Select lower indicator display, "BLANK (0), TOTAL (1), TEMP(2). When "BLANK" in B31 is selected, indicator is blank. "TEMP" can be selected when Option Code /MV.

[B40:TOTAL START]

Select the START/STOP of totalizer from "STOP (0), START (1)."

[B45:TOTAL RATE] Total rate of the totalizer

Set the total rate of the totalizer.

[B47:TOTAL RESET] Reset the totalizer

When totalizer reset function is executed, the total display and communication parameter are reset.

The following items should be done in case of which Option code "/MV" is selected.

[B50 A/OUT SELECT] Analog Output select

Select the analog output select from flow rate or temperature.
When changing the analog output, UPPER DISPLAY can be changed shown as below automatically.

B50 : A/OUT SELECT	UPPER DISPLAY
"TEMP" TO "FLOW"	FLOW (%)
"FLOW" TO "TEMP"	TEMP (%)

("B30 : UPPER DISPLAY" is "FLOW RATE", it can not be changed.)

The following item should be done in case of which B50 is "TEMP"

[B51 TEMP 0%] Temperature value of 0% output

Set temperature value of 0% output.

[B52 TEMP 100%] Temperature value of 100% output

Set temperature value of 100% output.

(3) Item C : BASIC SETUP

These items are for the basic parameters with setting before shipment.
The parameters which are set in B are not necessary to set in C.
A value in "( )" is the data corresponding to indicator.

The parameters, C20 to C50, are not indicated when option code "/MV" is selected and parameter item is selected in F10 except "Monitor only" or "Not Use".

[C10: TAG NO] Tag. No

Set Tag. No. (16 characters)
Available characters are as follows.

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z a b c d e f g h i j k l m n o p q r s t u v w x y z 0 1 2 3 4 5 6 7 8 9 . SPACE / - , + *) (' & % $ # " !

F0603.ai

[C20:FLUID] Flowrate unit

Set the flowrate unit below.

Item		Description
LIQUID : Volume	(0)	Volumetric flow of liquid measuring
GAS/STEAM : Volume	(1)	Volumetric flow of gas or steam measuring
LIQUID : Mass	(2)	Mass flow of liquid measuring
GAS/STEAM : Mass	(3)	Mass flow of gas or steam measuring
GAS : STD/Normal	(4)	Volumetric flow at Standard condition

The following items should be done in case of which "C20" is "LIQUID : Volume" or "GAS/STEAM : Volume".

[C22:VOLUME UNIT] Volumetric unit

Select the unit of volumetric flow from m^3(0), k m^3(1), l(2), cf(3), m cf(4), k cf(5), USgal(6), k USgal(7), UKgal(8), k UKgal(9), bbl(10), m bbl(11), k bbl(12).

The following items should be done in case of which "C20" is "LIQUID: Mass" or "GAS/STEAM : Mass"

[C25:DENSITY UNIT] Density Unit of Flow measurement

Select the unit of density from kg/m^3(0), lb(1), lb/USgal(2), lb/UKgal(3).

[C26:DENSITY f] Density at normal operation conditions

Set the density value of the fluid at operating condition for mass flow unit.

[C27:MASS UNIT] Mass flowrate unit

Select the mass flowrate unit from kg(0), t(1), lb(2), k lb(3).

The following item should be done in case of which "C20" is "GAS/STEAM : Volume".

[C30:TEMP UNIT] Fluid temperature unit at operating conditions

Select temperature unit at operating condition from "degC (0), degF (1)".

[C31:TEMP f] Fluid temperature at operating conditions

Set fluid temperature at operating condition.

The following items should be done in case of which "C20" is "GAS/STD : Normal".

[C32:TEMP b] Fluid temperature at standard/normal conditions

Set the values of Fluid temperature at standard condition.

[C33:PRESS UNIT] Pressure unit

Select the unit of pressure.

BRAIN		HART	
MPa abs	(0)	MPa abs	(0)
kPa abs	(1)	kPa abs	(1)
bar abs	(2)	kg/cm^2 a	(2)
kg/cm^2 a	(3)	bar abs	(3)
psia	(4)	psia	(4)

[C34:PRESS f] Absolute pressure at operating conditions

Set the absolute pressure at operating condition.

[C35:PRESS b] Absolute pressure at standard/normal condition

Set the absolute pressure at normal condition.

[C36:DEVIATION] Deviation factor

Set deviation factor.

[C37:STD/NOR UNIT] Volumetric unit at normal conditions

Select volumetric unit at normal condition from Nm^3(0), k Nm^3(1), M Nm^3(2), Nl(3), Sm^3(4), k Sm^3(5), M Sm^3(6), Sl(7), scf(8), k scf(9), M scf(10).
N: Normal
S: Standard

[C40:TIME UNIT] TIME UNIT

Select time unit from "/s(0), /m(1), /h(2), /d(3)"

[C45:FLOW SPAN] Flowrate span

Set the required span with a numerical value.

[C50:DAMPING] Damping time constant

Set damping time constant values from 0 to 99s.

(4) Item D (AUX. SETUP)

These items are for Auxiliary setup.
A value in "( )" is the data corresponding to indicator.

[D10:LOW CUT] Low-cut flowrate

NOTE

For D10 setting, be sure to set "NOMINAL SIZE" in E10 firstly.

Set to noise elimination or zero flow in the low flowrate (or low frequency) range. The settable range for low cut flowrate is more than half-minimum flowrate.

NOTE

In case that Reynolds adjustment (H25), Gas expansion correction (H30) or select a break point correction (H40) is necessary to set, D10: LOW CUT must be set after the items for compensations (H25, H30, H40) are set to "ACTIVE".

[D20:TEMP UNIT] Fluid temperature unit at operating conditions

Select temperature unit at operating condition from deg C (0), deg F (1).

[D21:TEMP f] Fluid temperature at operating conditions

Set fluid temperature at operating condition.

[D25:DENSITY UNIT] Density Unit of Flow measurement

Select the unit of density from kg/m^3(0), lb/cf(1), lb/USgal(2), lb/UKgal(3).

[D26:DENSITY f] Density at normal operation conditions

Set the density value of the fluid at operating condition for mass flow unit

[D30:OUT LIMIT] Limit value of output and indication

Set limit value of output from 100.0% to 110.0%

[D35:BURN OUT] Indication of the output direction at burn out

This is indication of the output direction at burn out. Refer to Subsection 10.1.6 "Setting of Burnout Switch" when the output direction can be changed.

[D40:SPECIAL UNIT] Change to special flowrate unit

No(0) : Off the function
Yes(1) : Convert the flow unit for USER'S UNIT
The factor to convert the flow unit comes from D43. The time unit comes from C40 or F35.
Special(2) : Convert the flow unit and time unit for the USER'S UNIT.
The factor to convert the flow unit and time unit comes from D43.

[D41:BASE UNIT] Indication of the base flowrate unit

Indication of the basic flowrate unit when item D40 is "Yes(1)" or "Special(2)".

[D42:USER'S UNIT] Free unit for users

Set in up to 8 alphanumeric characters when item D40 is "Yes(1)" or "Special(2)".
The character and sign which can be set up are the same as C10.

[D43:CONV FACTOR] Conversion factor

Set the conversion factor when item D40 is "Yes(1)" or "Special(2)".
Set the conversion factor which is for both flow unit and time unit in case of "Special(2)".

(5) Item E (METER SETUP)

These items are for detector set up that has already been set before shipment.
A value in "( )" is the data corresponding to indicator.

[E10:NOMINAL SIZE] Nominal size of the detector

Select the nominal size of the flowmeter, from 15mm(0), 25mm(1), 40mm(2), 50mm(3), 80mm(4), 100mm(5), 150mm(6), 200mm(7), 250mm(8), 300mm(9), or 400mm(10).

[E20:BODY TYPE] Body type for the detector

Select body type for detector from standard or high pressure.

Standard	(0) : Standard type
High Pressure	(1) : High Pressure type (TOKUCHU)
Low Flow Unit (1)	(2) : Reduced Bore type (option code: /R1)
Low Flow Unit (2)	(3) : Reduced Bore type (option code: /R2)

NOTE

Parameter setting for the Reduced Bore type, Select Low Flow Unit (1) or (2) and set. Set nominal size of the model code to E10: NOMINAL SIZE.

[E30:SENSOR TYPE] Sensor type for the detector

Select sensor type for the detector from standard, /HT, or /LT.

Standard	(0) : Standard type
High Temperature	(1) : High Process Temperature Version
Low Temperature	(2) : Cryogenic Version

[E40:K-FACTOR UNIT] K-factor unit

Select this unit from p/l, p/USgal, p/UKgal.

IMPORTANT

K-FACTOR is the eigenvalue of each detector. Please keep the factory preset value. NEVER REWRITE IT. (Unless the replacement of the remote type detector.)

[E41:K-FACTOR] K-factor

The flowmeter name plate includes a K-factor (KM) at 15°C for the combined detector.

[E50:DETECTOR NO.] Detector number of flowmeter

Set the serial number using 16 alphanumeric characters of the detector combined converter.

(6) Item F (Thermometer)

These items are for setting of thermometer and available when build in thermometer type (Option code: /MV).

[F10: Function] Thermometer function

Select the thermometer function.

Monitor only (0):	Only temperature measurement.
Saturated Steam (1):	Mass Flow rate is calculated from density values by temperature measurement using saturated steam table.
Superheat Steam (2):	Mass Flow rate is calculated from density values by temperature measured by using steam table. In order to measure superheat steam. It is necessary to make constant pressure value.
GAS: STD/Normal (3):	Volumetric flow rate at standard condition is calculated by using Pressure- Temperature correction. It is necessary to male constant pressure value.
LIQUID: Mass (4):	Mass flow rate is calculated by using the density change values depend on temperature values by which the secondary order function is used.

The following item should be done in case of which F10 is Saturated steam

[F12 MASS UNIT] Mass flow unit

Select mass rate unit from kg(0), t(1), lb(2), k lb(3).

The following items should be done in case of which F10 is Superheat steam

[F14 PRESS UNIT] Pressure unit

Select pressure unit from MPa abs(0), kPa abs(1), bar abs(2), kg/cm^2 a(3), psia(4).

[F15 PRESS f] Pressure value

Set absolute pressure values at operating condition.

[F16 MASS UNIT] Mass flow unit

Select mass flow unit from kg(0), t(1), lb(2), k lb(3).

The following items should be done in case of which F10 is GAS: STD/Normal

[F18 TEMP UNIT] Temperature unit

Select temperature unit from deg C(0), deg F (1).

[F19 TEMP b] Temperature b

Set temperature value at normal/standard condition.

[F20 PRESS UNIT] Pressure unit

Select pressure unit from MPa abs(0), kPa abs(1), bar abs(2), kg/cm^2 a(3), psia(4).

[F21 PRESS f] Pressure value f

Set absolute pressure values at operating condition.

[F22 PRESS b] Pressure value b

Set absolute pressure values at normal/standard Condition.

[F23 DAVIATION] Daviation factor

Set the daviation factor.

[F24 STD/NOR UNIT] Standard/Normal unit

Select Volumetric unit at standard/normal condition
From Nm^3(0), k Nm^3(1), M Nm^3(2), Nl(3), Sm^3(4)
k Sm^3(5), M Sm^3(6), Sl(7), scf(8), k scf(9), M scf(10)
N: Normal
S: Standard

The following item should be done in case of which F10 is LIQUID:MASS

[F26 DENSITY UNIT] Density unit

Select density unit from kg/m3(0), lb/cf(1), lb/USgal(2), lb/UKgal(3).

[F27 DENSITY b] Density b

Set density value at standard condition.

[F28 TEMP UNIT] Temperature unit

Select temperature unit from deg C(0), deg F(1).

[F29 TEMP b] Temperature b

Set temperature value at standard condition

[F30 1st coef] 1st coefficient

Set 1st temperature coefficient using the density correction.

[F31 2nd coef] 2nd coefficient

Set 1st temperature coefficient using the density correction.

[F32 MASS UNIT] Mass unit

Select mass flow rate unit from kg(0), t(1), lb(2), k lb(3).

[F35 TIME UNIT] Time unit

Select time unit from /s(0), /m(1), /h(2), /d(3).

[F40 FLOW SPAN] Flow span

Set span flow rate, 0 to 32000.

[F45 DAMPING] Flow damping

Set flow damping, 0 to 99sec.

[F50 TEMP DAMPING] Temperature damping

Set temperature damping, 0 to 99sec.

[F52 CABLE LENGTH] Cable length of signal cable(DYC)

Set cable length(m) of signal cable.
In case of the integral type, cable length is set in 0m.

IMPORTANT

Be sure to set this parameter to correct temperature measurement error, occured by cable length.

[F55 A/OUT SELECT] Analog out select

Select the analog output from FLOW(0), TEMP(1).

The following item should be done in case of which F55 is TEMP

[F56 TEMP 0%] Temperature at 0%

Set temperature value at 0%.

[F57 TEMP 100%] Temperature at 100%

Set temperature value at 100%.

[F58 TEMP ERR OUT] Output selection of thermometer error

Select output function when thermometer error from 0%(0), OUTLIMIT(H)(1), TEMP f.
In case of OUT LIMIT(H), it is based on parameter “D30”

(7) Item H (ADJUST)

This item for setting of adjustment.

NOTE

In case that Reynolds adjustment (H25), Gas expansion correction (H30) or select a break point correction (H40) is necessary to set, D10: LOW CUT must be set after the items for compensations (H25, H30, H40) are set to "ACTIVE".

[H10, H11:TRIM 4mA, TRIM 20mA] Triming of 4mA and 20mA

Fine tuning adjustment of 4mA and 20mA output.
Fine tuning range is form -1.00% to 1.00%.

[H20:USER ADJUST] Conversion factor for user setting.

Set conversion factor by user.
This conversion factor is converted into measurement flowrate.

[H25:REYNOLDS ADJ] Reynolds adjustment

Select the Reynolds adjustment.
This adjustment should be done in case of their error compensation, because error of vortex flowmeter should be increased when it come to low reynolds numbers.
NOT ACTIVE(0): Not correction calculation
ACTIVE(1): Correction calculation

The following item should be set in case of which "H25" is "ACTIVE".

[H26:DENSITY f] Density at operating condition

Set the density at operating condition.

[H27:VISCOSITY] Viscosity at standard condition

Set the value of viscosity at standard conditions.
The values should be used for Reynolds adjustment.
Reynolds number(Re) is calculated as shown in the formula below.

$$Re = 354 \times \frac{Q \times \rho_f}{D \times \mu}$$

Q: Volumetric flow (m^3/h)
D: Internal diameter (mm)
ρ_f: Density at operating condition
μ: Viscosity (m Pa · s (cp))

Flowrate error of vortex flowmeter increases as Reynolds number decrease less than 20000.
By setting H25, H26, H27, it corrects the error.

[H30:EXPANSION FA] Gas expansion correction.

When measuring a compressibility gas by mass flow (Steam M, Gas M) and standard condition (Gas Qn), this expansion factor is useful to correct the deviation from the ideal gas law.

[H40:FLOW ADJUST] Select a break point correction

Select a break point correction for the instrumental error from "NOT ACTIVE(0)" or "ACTIVE(1)".

[H41 to H50] Instrumental Error Correction

■ Correct the instrumental error in flowmeter characteristics using 1 line-segment approximation (with five correction factors).

(1) Flow frequency input at line segments needs to be $f_1 \leq f_2 \leq f_3 \leq f_4 \leq f_5$.
When four correction factors are available, line segments need to be $f_4=f_5$ and $d_4=d_5$.
When three correction factors are available, line segments need to be $f_3=f_4=f_5$ and $d_3=d_4=d_5$.
(2) When a flow input of f_1 or less is present, correct the instrumental error as the corrected value=d_1.
(3) When a flow input of f_5 or more is present, correct the instrumental error as the corrected value=d_5.
(4) Abscissa (f_1 to f_5) : Set the break-point frequencies as parameters.
(5) Ordinate (d_1 to d_5) : Set the corrected value (%) at each break-point as parameters.

$$\text{Set value} = -\frac{Q_s - I}{I} \times 100$$

Where
Q_s : Correct flowrate determined by a reference apparatus
I : Indication of vortex flowmeter

- Definition of error varies with the type of flowmeter. Be careful of the difference in signs in the error and corrected value.

$$Q_f = \frac{f(Hz)}{K\text{-factor}} \times 100$$

holds and the error is included in the K-factor. Therefore, for the region where the K-factor shift on the positive side, the corrected value is negative.
The corrected value when the calibration fluid of the flowmeter and the fluid to be measured are different must be set as a corrected value obtained by making both abscissas agree with respect to the Reynolds number.

(8) Item J (TEST)

These items are for test of output.
A value in "( )" is the data corresponding to indicator.
The test output by setting in J10, J20 or J30 is automatically released when shifts from these parameter items or as following time goes without access to these parameter items.
"K50: SOFTWARE REV" = "6.20" or less: 10 minutes
"K50: SOFTWARE REV" = "7.00" or greater: a value set in J40: RELEASE TIME

[J10:OUT ANALOG] 4 to 20mA Current output

It tests 4 to 20mA Current output. Electric current of the set value (%) which designates 4 to 20mA as 0 to 100%.
When this test is executed, transistor contact output (Pulse, Alarm, Status) is fixed at ON or OFF (not determined).

[J20:OUT PULSE] Pulse output

It tests Pulse output.
The number of pulses which is set (unit: PPS) is output.
Exiting this parameter item or stopping access after ten minutes which is set in J40, this function will be reset automatically.
When this test is executed, current output is fixed at 0% (4mA).

[J30:OUT STATUS] Status output test

Status output test can be executed (OFF(0) or ON(1)).
When this test is executed, current output is fixed at 0% (4mA).
Exiting this parameter item or stopping access after ten minutes, this function will be reset automatically.

[J40:RELEASE TIME] Release time

Automatic reset time of J10, J20 and J30 can be change.
Select from 10min (0), 30min (1), 60min (2), 3h (3), 6h (4), or 12h (5).

(9) Item K (Maintenance)

These items are for maintenance.
A value in "( )" is the data corresponding to indicator.

[K10:TLA] TLA Adjustment

Trigger level (TLA) is adjusted upon shipment. Therefore, TLA adjustment is nonnecessity. But set TLA adjustment below as

- The measurement of Low flow rate area is required.
- Mechanical vibration and impact are applied to digitalYEWFLO and Zero point and low flow rate area is output.
  Note: Refer to Section 10.2 "Adjustment for Manual Mode".

[K20:SIGNAL LEVEL] Signal Level

Set the signal level.

[K25:N. B. MODE] Noise Balance Mode

Set the Noise Balance Mode from "AUTO(0)", "MANUAL(1)", or "TUNING AT ZERO(2)"

[K26:N. B.RATIO] The ratio of Noise Balance

When "NOISE BALANCE MODE (N. B. MODE)" is "AUTO", noise balance value is the indication only.
When N.B. mode is "MANUAL", the noise balance can be adjusted entering the setting values.
Note: Refer to Section 10.2 "Adjustment for Manual Mode".

[K28:SET VORTEX F] Output test by setting simulated frequency

Amplifier check is executed by simulated frequency input.
Output to be able to check are, analog output, pulse output/contact output.
Test status also can be seen on display board.

NOTE

- In case of multi-variable type (option code: /MV), output value is calculated by setting density and temperature.
- Available for 5.10 or greater version that can be checked in K50 SOFTWARE REV.

[K30:VELOCITY] Flow velocity

Indication of flow velocity at the operating conditions.

[K32:SPAN V] Flow span velocity

Indication of flow span velocity.
When /MV is selected and “F10 : FUNCTION” is “Saturated Steam” or “Superheat Steam” and “GAS : STD/Normal” or “LIQUID : Mass”, the display of span velocity may differ from an actual value.

[K34:VORTEX FREQ.] Vortex frequency.

Indication of vortex frequency at operating conditions.

[K36:SPAN F] Span vortex frequency.

Indication of span vortex frequency.
When /MV is selected and “F10 : FUNCTION” is “Saturated Steam” or “Superheat Steam” and “GAS : STD/Normal” or “LIQUID : Mass”, the display of span frequency may differ from an actual value.

[K40:ERROR RECORD] Error record

The error record can be indicated.

- The error is recorded as history.
- The error history is not time-series data.
- The error history can be holded for 30 days.

In order to clear an error record, set the video inverse bar by “< >” and press “ENTER”key twice.

[K45:H VIBRATION] Selection of output operation

Select the output operation when “High Vibration” in self-diagnosis.

[K50:SOFTWARE REV] Software revision

The software revision can be indicated.

6.5 Self-Diagnostic (Error Code List)

When an ERROR is displayed by SELF CHECK in item A60, B60, C60, D60, E60, H60, J60, K60 or M60, press function key F2 [DIAG] and the error contents are displayed.

Indication	Diagnostic Message	Error Name	Problem Cause	% Output				Totalizing Output	Engineering Temp Output	Pulse / Status Output			How to recover
				Current Output		Pulse Output	Engineering Unit Output			Pulse(*2)	Status(*2)	Alarm(*2)	
				Select flow rate	Select temperature	Select flow rate	Select temperature						
Err-01	FLOW OVER OUTPUT	Over range output signal	Output signal is 110% or more(*1)	Fixed at 110%(*1)	Normal Operation	Fixed at 110%(*1)	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	OFF(H)	Change parameters or over ranged flow input
Err-02	SPAN SET ERROR	Span Setting Error	Span setting parameter is more than 1.5 times of max flow velocity	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	OFF(H)	Change parameters span factor is outside the acceptable limits
Err-06	PULSE OUT ERROR	Pulse output error	Pulse output frequency is more than 10kHz	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Fixed at 10KHz	Normal Operation	Normal Operation	Fixed at 10kHz		Change parameters (ItemC,ItemE)
Err-07	PULSE SET ERROR	Pulse setting error	Pulse output frequency setting is more than 10kHz	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation		Change parameters (ItemC,ItemE)
CHECK Vibration	Transient noise	Error of Vibration	Transitional disturbance	Hold	Normal Operation	Hold	Normal Operation	Normal Operation	Hold	Normal Operation	Hold	OFF(H)	CHECK the vibration
CHECK Vibration	High vibration	Error of Vibration	High vibration	Based on K45	Normal Operation	Based on K45	Stop Output	Stop the total	Based on K45	Normal Operation	Normal Operation	OFF(H)	CHECK the vibration
CHECK Flow	Fluctuating	Error of Flow	Fluctuating	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	OFF(H)	CHECK the clogging
CHECK Flow	Clogging	Error of Flow	Clogging	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	OFF(H)	CHECK the clogging
Err-10(*3)	TEMP OVER OUTPUT	Over range Temp output signal	Temp output signal is 110% or more, and 0% below.	Normal Operation	Fixed at 110% in case of over 110%, and fixed at 0% when in case of less than 0%.(*1)	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	OFF(H)	CHECK the temperature or temperature span
Err-11(*3)	OVER TEMP	Error of temperature	Temp value is -50°C below or 300°C over.	Remain in operationat Temp=-50°C or Temp=300°C	Remain in operation at Temp=-50°C or Temp=300°C	Remain in operationat Temp=-50°C or Temp=300°C	Remain in operation at Temp=-50°C or Temp=300°C	Remain in operation at Manual setting condition	Remain in operation at Temp=-50°C or Temp=300°C	Remain in operation at Temp=-50°C or Temp=300°C	Remain in operation at Temp=-50°C or Temp=300°C	OFF(H)	CHECK the temperature
Err-12(*3)	TEMP SENSOR FAULT	Error of thermometer	Disconnection or short of thermometer sensor	Remain in operation at Manual setting condition	Based on F58	Remain in operation at Manual setting condition	Remain in operation at Manual setting condition	Remain in operation at Manual setting condition	Based on F58	Remain in operation at Manual setting condition	Remain in operation at Manual setting condition	OFF(H)	Change thermometer sensor.
Err-13(*3)	TEMP CONV. FAULT	Error of temperature converter	Temperature converter is failed	Remain in operation at Manual setting condition	Based on F58	Remain in operation at Manual setting condition	Based on F58	Remain in operation at Manual setting condition	Based on F58	Remain in operation at Manual setting condition	Remain in operation at Manual setting condition	OFF(H)	Change converter case build in temperature sensor.
Err-20	PRE-AMP ERROR	PRE-AMP is failed		Normal Operation	Remain in operation at Manual Setting Temperature Value	Normal Operation	Remain in operation at Manual Setting Temperature Value	Normal Operation	Remain in operation at Manual Setting Temperature Value	Normal Operation	Normal Operation	OFF(H)	Replace the AMP. unit
Err-30	EE PROM ERROR	EEPROM is not functioning correctly		Over 110% or -2.5% below	Over 110% or -2.5% below	Fixed at 0%	Fixed at 0%	Halt	Fixed at 0%	Halt	OFF(H)	OFF(H)	Replace the AMP. unit
Err-40	FLOW SEBSOR FAULT	Error of Flow sensor	Flow sensor Is fault.	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	OFF(H)	Change Flow sensor
	CPU FAULT	CPU is failed	All operations are Dead. Display and self dignostic function is also dead.g	Over 110% or -2.5% below	Over 110% or -2.5% below	Halt	Halt	Halt	Halt	Halt	Halt	Halt	Replace the AMP. unit

Note. Normal Operation : Operation continues without relation to error occurrence.
Remain in Operation : Calculation continues with relation to error occurrence.

(*1): "110%" is based on "D30 : OUT LIMIT(H)".
(*2): Pulse output : These conditions should be done in case of which B20 is "SCALED PULSE", "UNSCALED PULSE", "FREQUENCY".
Status output : These conditions should be done in case of which B20 is "FLOW SW (LOW :ON)", "FLOW SW (LOW : OFF)".
Alarm output : These conditions should be done in case of which B20 is "Alarm".
(*3): Only for /MV

7. OPERATION FOR THE BRAIN TERMINAL (BT200)

This chapter describes the operation procedures using a BRAIN TERMINAL (BT200). For details on the functions of the digitalYEWFLO, refer to Chapter 6 “PARAMETERS.” List. And also, refer to the “Model BT200 BRAIN TERMINAL” Instruction Manual (IM 01C00A11-01E) for more detailed Information.

7.1 Connection Method for the BT200

(1) Connecting the BT200 to a 4 to 20mA DC Transfer Line

The communication signal of the digitalYEWFLO is superimposed onto the 4 to 20mA DC analog signal to be transferred.

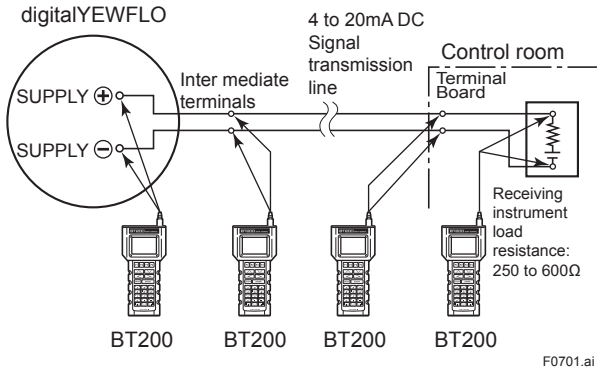


Figure 7.1 Communicating for a 4 to 20mA DC Signal Line

IMPORTANT

The communicable distance of the transmission line is restricted depending on the wiring method. Refer to Chapter 4 “WIRING.”

IMPORTANT

After setting a parameter, keep the power on for at least 30 seconds.
If the power of flowmeter is turned off, a parameter setting is released.

(2) Connection of BT200 to Flow Converter

Removing a cover and indicator, the terminals for BRAIN communication are provided on the circuit board.
Connect BT200 to the terminal of HHT-COM on the circuit board.

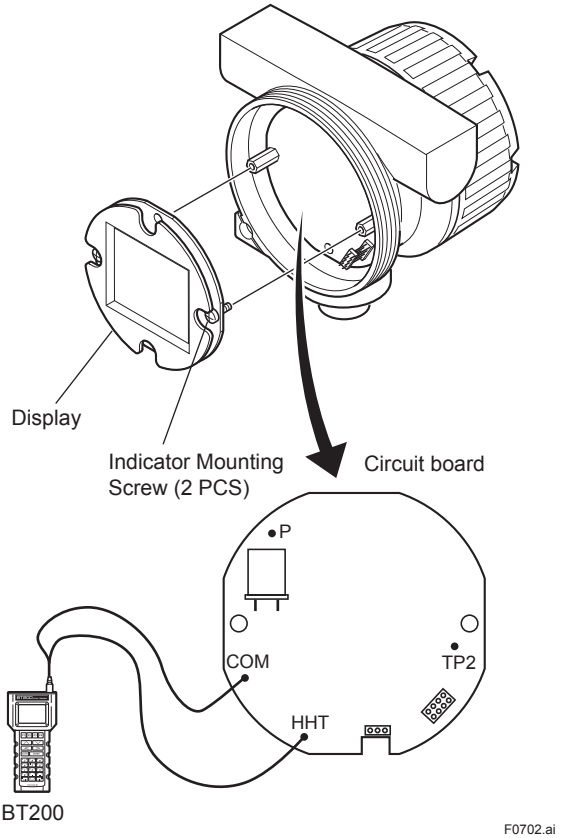
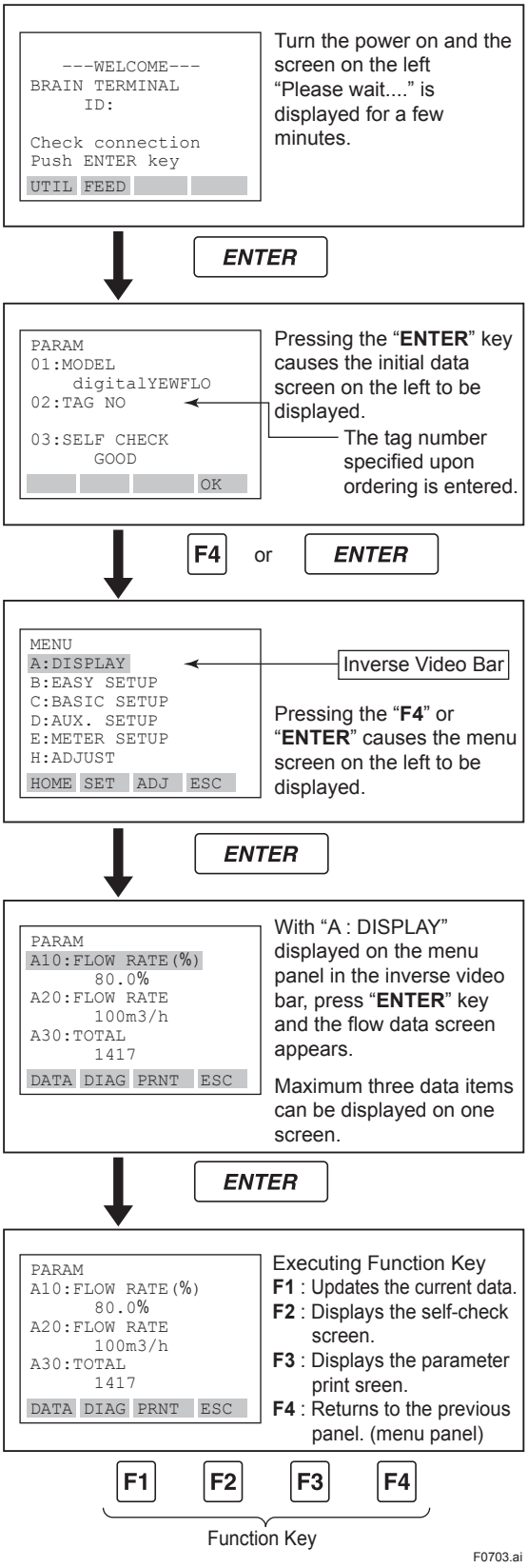


Figure 7.2 Connection of BT200 to Flow Converter

7.2 BT200 Screen and Displaying Flow Rate

Flowrate data can be displayed on the BT200 screen according to the following procedure.



● Function key

The functions of the function keys vary with the commands being displayed on the display panel.

Table 7.1 Function Command List

Command	Function
ADJ	Displays the ADJ menu
CAPS/caps	Selects uppercase or lowercase
CODE	Selects symbols
CLR	Erases input data or deletes all data
DATA	Updates parameter data
DEL	Deletes one character
DIAG	Calls the self-check panel
ESC	Returns to the most recent display
HOME	Displays the menu panel
NO	Quits setup and returns to the previous display
OK	Proceeds to the next panel
PRAM	Enters the parameter number setup mode
SET	Displays the SET menu
SLOT	Returns to the slot selection panel
UTIL	Calls the utility panel
COPY*	Prints out parameters on display
FEED*	Paper feed
LIST*	Lists all parameters in the menu
PON/POFF*	Automatic printout mode on or off
PRNT*	Changes to the print mode
GO*	Starts printing
STOP*	Cancels printing

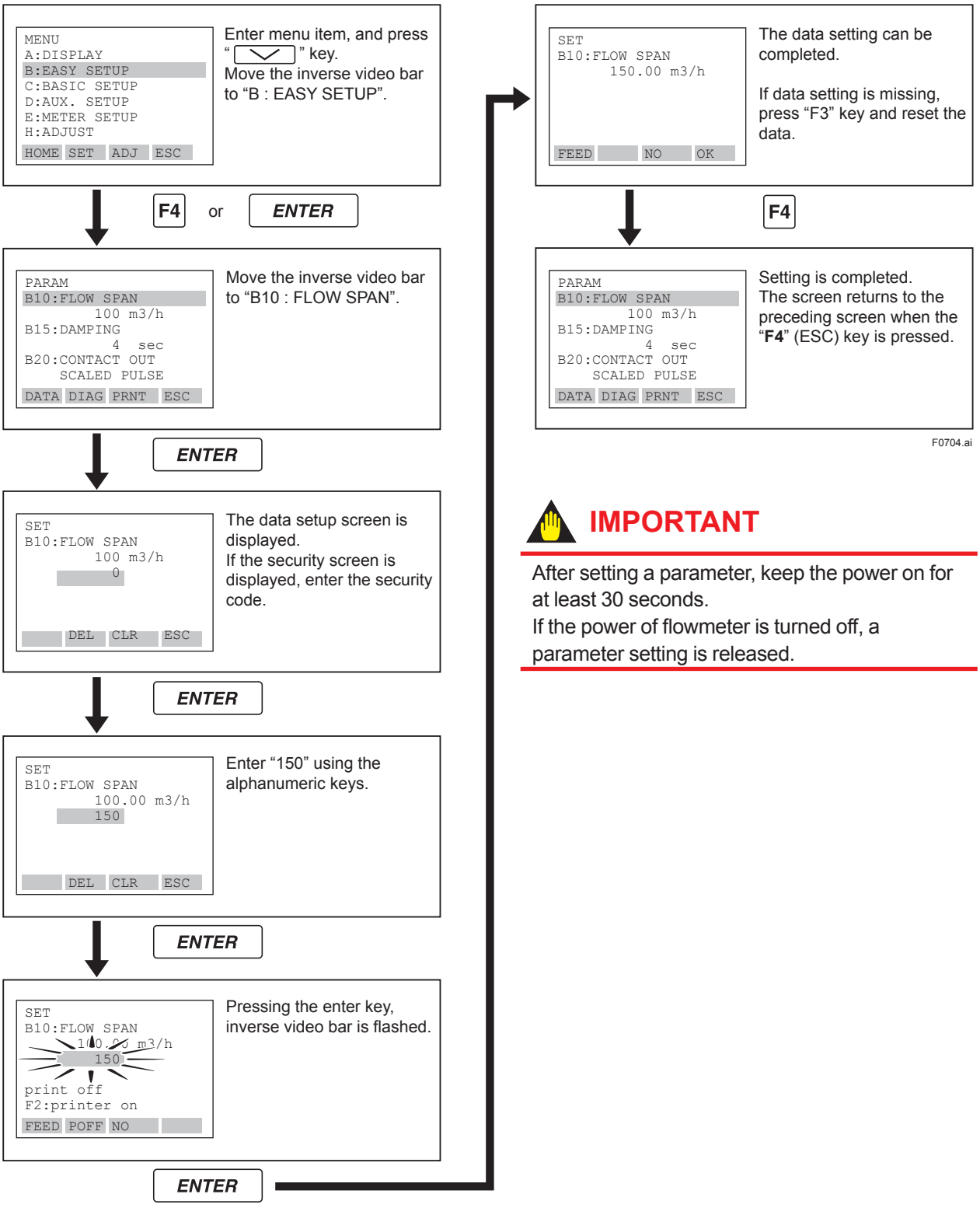
*Available on BT200-P00 (with printer).

7.3 Setting Parameters using BT200

This section describes the setting method using a BRAIN TERMINAL (BT200). For details on the method, refer to Section 6.3 “Parameters List” and Section 6.4 “Parameters Description”.

(1) Setting Flow Span

Example : Change flow span 100m³/h to 150m³/h



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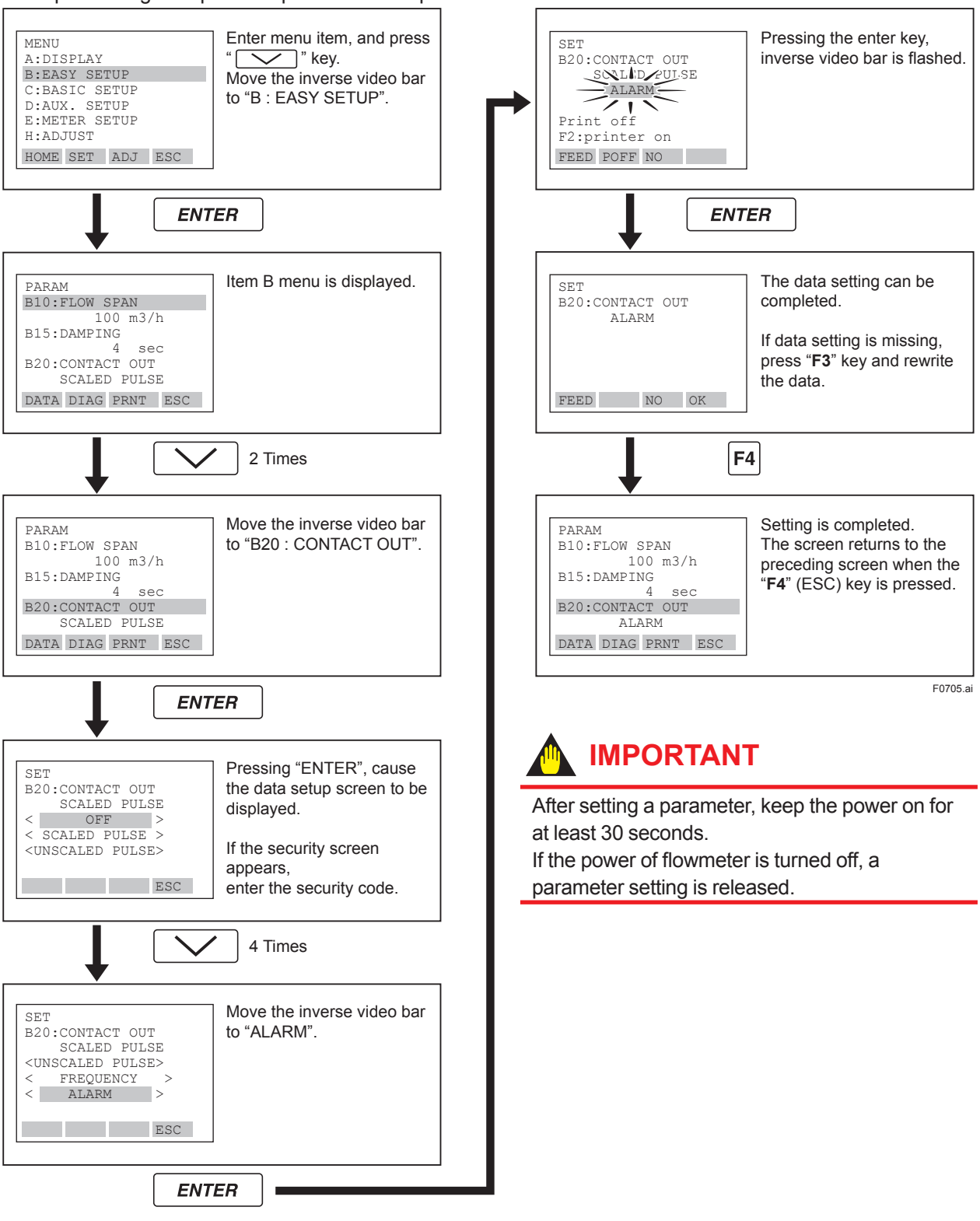
IMPORTANT

After setting a parameter, keep the power on for at least 30 seconds.
If the power of flowmeter is turned off, a parameter setting is released.

(2) Setting Output

Example: Change the pulse output to alarm output



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IMPORTANT

After setting a parameter, keep the power on for at least 30 seconds.
If the power of flowmeter is turned off, a parameter setting is released.

8. OPERATION VIA HART CONFIGURATION TOOL (HART 5)

NOTE

In this User's Manual, HART protocol revision 5 and 7 are described as HART 5 and HART 7 respectively.

Note: HART is a registered trademark of the HART Communication Foundation (HCF).

8.1 HART Protocol Revision

For the models with the output signal code "-J", HART protocol revision 5 or 7 is selectable. The protocol revision is set as specified in the order.

- Confirmation by the name plate
  The HART protocol revision is shown by the last number of the serial number.

In the case of the communication code "-J"

The HART protocol revision is shown by the last number of the serial number.

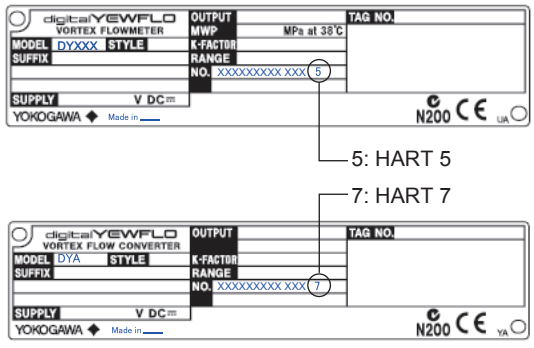

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Figure 8.1 Name Plate

8.2 HART Configuration Tool and Matching of Device Revision

Before using the HART Configuration Tool (such as FieldMate), confirm that the DD (Device Description) of the digitalYEWFLO is installed in the Configuration Tool before using.
DY and DYA HART 5
Device type: 0x37, Device revision: 3 or 4

IMPORTANT

Protocol revision supported by HART configuration tool must be the same or higher than that of the digitalYEWFLO.

	Protocol Rev. supported by HART configuration tool	
	5	7
DY or DYA HART 5	Available	Available
DY or DYA HART 7	Not available	Available

The DD revisions for digitalYEWFLO and Configuration Tool's can confirm in accordance with the following steps.
If the correct DD is not installed in the HART Configuration Tool, download them from the official HART programming sites, otherwise, contact the respective vendors of the Configuration Tool for its upgrade information.

1. Confirmation of the device revision for digitalYEWFLO
   Procedure to call up the field device revision
   [Root Menu] → Review → Review1
   'Fld dev rev' in the Review1 shows the revision number of correspondent field device.
2. Confirmation of the device revision for the HART Configuration Tool
   (1) Confirm the installed DD revision in accordance with the procedure of the Configuration Tool. Refer to its manual how to confirm it in detail.
   The first 2 digits of the DD file are expressed the device revision, and its last 2 digits are expressed the DD revision.

   01 01.XXX
   - 01.XXX: DD revision
   - 01: Device revision

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8.3 Setting Parameters using DTM

When configure the parameters using FieldMate, use the DTM (Device Type Manager) refering to the following table.

DTM Name	Device Type	Device Revision
DYF V3.1	0 x 37	3
DYF V4.1	0 x 37	4

8.4 Interconnection between digitalYEWFLO and HART Configuration Tool

The HART Configuration Tool can interface with the digitalYEWFLO from the control room, the digitalYEWFLO site, or any other wiring termination point in the loop, provided there is a minimum load resistance of 250 Ω between the connection and the receiving instrument. To communicate, it must be connected in parallel with the digitalYEWFLO, and the connections must be non-polarized. Figure 8.2 illustrates the wiring connections for a direct interface at the digitalYEWFLO site. The HART Configuration Tool can be used for remote access from any terminal strip as well.

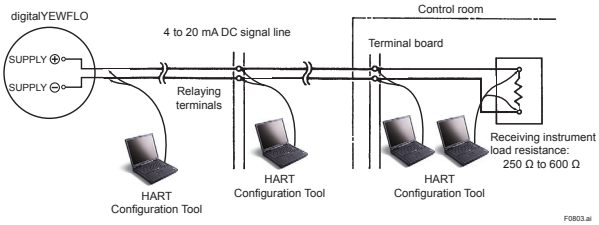

Figure 8.2 Connecting the HART Communicator

WARNING

Be sure to set parameters as “Protect” on the write protect function after finish of parameter setting work. Refer to Section 8.9 “Software Write Protect” how to use the write protect function in detail.

IMPORTANT

If the power of flowmeter is turned off within 30 seconds after parameters have been set, these settings will be canceled. Accordingly, please keep the power on for at least 30 seconds after setting parameters.

NOTE

Before updating any setting, remember to always check the data content you want to change as described in Section 6.4 “Parameters Description”.

8.5 Basic Setup

■ Tag and Device Information

The tag number and device information can be checked as follows:

- The location for the tag number and device information

Item	Precedure
Tag	[Root Menu] → Basic setup → Tag
Descriptor	[Root Menu] → Detailed setup → Device information → Descriptor
Message	[Root Menu] → Detailed setup → Device information → Message
Date	[Root Menu] → Detailed setup → Device information → Date

When changing the tag number or device information, enter the information directly within the following limitations.

Item	Number and characters
Tag	8 *1
Descripter	16 *1
Message	32 *1
Date	2/2/2 (mm/dd/yy) • mm : month • dd : day • yy : year

*1: All characters in the following table can be used.

SPACE	!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_

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8.6 Parameter Setting

The parameter structure of the HART configuration tool is hierarchical.
Refer to Section 8.11 “Menu Tree (HART 5)” for the corresponding parameters. The menu tree shows a cross-reference of the parameters for HART configuration Tool and BRAIN Terminal.
Refer to Section 6.4 “Parameters Description” for the functions of parameters.
Note that some display parameters of digitalYEWFLO are different from those of HART Configuration Tools.

8.7 Data Renewing and Upload/ Download function

(1) Data renewing
Following data are renewed in 0.5 to 2 seconds cycle.
PV, PV%, rnge, PVAO1, Total
Temp, TV% rnge, AO3: only for /MV

(2) Upload/download function
Upload/download parameters from digitalYEWFLO to the HART Configuration Tool.
Refer to Section 8.11 “Menu Tree (HART 5)” for the applicable parameters.

8.8 Self-Diagnostic

The self-diagnostic function of the digitalYEWFLO is explained in Section 6.5 “Self-Diagnostic (Error Code List)”.
It is also possible to carry out this function via HART Configuration Tool.
Procedure to call up **‘Self test/Status’**;
[Root Menu] → Diag/Service → **Self test/Status** *(M)
(M): METHOD
METHOD is a program to faciliate the parameter settings.

8.9 Software Write Protect

digitalYEWFLO configured data is saved by using a write protect function. The write protect status is set to “Yes” when 8 alphanumeric characters are entered in the **New password** field and transferred to the device. When write protect is set to “Yes,” the device does not accept parameter changes. When the same eight alphanumeric string entered in the **New password** field is also entered in the **Enable wrt 10min** field and transferred to the digitalYEWFLO, it will be possible to change the device parameters during a 10 minute period.
To change the digitalYEWFLO from the write protect “Yes”status back to Write protect “No” status, use **Enable wrt 10min** to first release the write protect function and then enter eight spaces in the **New password** field.

8.10 Specific Functions of HART Configuration Tool

8.10.1 Burst Mode

digitalYEWFLO continuously sends the data via HART Configuration Tool when the burst mode is set on. The data is sent intermittently as a digital signal at 3 times a second.
Procedure to call up **‘Burst option’** and **‘Burst mode’**;

(1) Setting the data to be sent
[Root Menu] → Detailed Setup → Configure outputs → HART Output → **Burst option**
Select the type of data to be sent from the following options:
- Instantaneous flow rate (PV)
- Output in % and current output (% range/ current)
- Current output, PV, SV, TV, QV

(2) Setting the burst mode
[Root Menu] → Detailed Setup → Configure outputs → HART Output → **Burst mode**
Then, select “**On**” at the menu to start the burst mode.
To release from the burst mode, call up the burst mode display, and set to “**Off**.”
The default setting is “**Off.**”

8.10.2 Multidrop Mode

"Multidropping" devices refers to the connection of several devices to a single communications transmission line. Up to 15 devices can be connected when set in the multidrop mode. To activate multidrop communication, the device address must be changed to a number from 1 to 15. This change deactivates the 4 to 20 mA analog output, sending it to 4 mA. The alarm current is also disabled.

(1) Polling address

- Procedure to call up the display

DD (HART 5)	**[Root Menu]** → Detailed setup → Configure outputs → HART output →
DTM (HART 5)	Configuration → HART →
→ Poll addr	Enter the number from 1 to 15

(2) Enabling the Multidrop Mode

About the procedure to call up the **Polling** display, please refer to the User's Manual of each configuration tool.

NOTE

When the same polling address is set for two or more devices in multidrop mode, communication with these devices are disabled.

(3) Communication when set in multidrop mode.

- The HART configuration tool seaches for a device that is set in multidrop mode when it is turned on. When the HART configuration tool is connected to the device, the polling address andthe tag will be displayed.
- Select the desired device. After that, normal communication to the selected device is possible. However, the communication speed will be slow.

To release multidrop mode, call up the **Poll addr** display and the address to "0".

8.10.3 Switching HART Protocol Revision

When the output signal code is "-J", HART protocol revision of device can be selectable from 5 or 7. The HART protocol revision is set and shipped as specified in the order.

To change the HART protocol revision after shipment, follow the procedure shown below.

IMPORTANT

When change the protocol revision, confirm the items below.

- Protocol revision supported by HART configuration tool must be the same or higher than new protocol revision of the device. (Refer to Section 8.1 "HART Protocol Revision")
- Confirm that the DD or DTM which is suitable to new protocol revision of device is installed in the configuration tool. (Refer to Section 8.1 "HART Protocol Revision" and Section 8.2 "HART Configuration Tool and Matching of Device Revision")

(1) Call up the parameter for protocol revision change

- Call up the parameter for protocol revision change Procedure to call up the **Chng universal rev** display.
  [Root Menu] → Detailed setup → Device information → Revision numbers → Chng universal rev

(2) Active the parameter for protocol revision change

- Active the "Chng universal rev" method

IMPORTANT

The message is displayed to separate the device from the automatic control loop.
Confirm that the device is separated.

(3) Set the protocol revision number

Input the new revision number
An input column for new protocol revision number is displayed.
Input the new HART protocol revision number of "5" for HART 5 or "7" for HART 7.
Confirm the revision number in the 'Next universal rev'.
[Root Menu] → Detailed setup → Device information → Revision numbers → Next universal rev

(4) Applying the new protocol revision

a. Close the configuration tool
After completion of Chng universal rev method, close the HART configuration tool.

NOTE

When using a Fieldmate, close the main display of FieldMate.

b. Restart the device
Turn off the power to the device, and turn it on.

IMPORTANT

New protocol revision is applied only after having performed restart of the device.

NOTE

A new HART revision number is displayed on the indicator after restart the device.

(5) Confirmation of the protocol revision number

Confirming the new protocol revision

a. Restart the HART configuration tool

NOTE

When execute the other parameter configuration or setting change, execute after restart the configuration tool.

b. Confirm the new HART protocol revision number
Callup the **Universal rev** parameter, and confirm that the new HART revision number is displayed.

- Procedure to call up the **Universal rev**. parameter.
[Root Menu] → Review → Review1 → Universal rev
5: HART protocol revision 5
7: HART protocol revision 7

8.10.4 Other Operations for the HART Configuration Tool

Regarding other operations for the HART Configuration Tool, refer to the HART Configuration Tool operations manual.

8.11 Menu Tree (HART 5)

Menu tree is different from DD and DTM. Refer to menu tree for configuration tool to be used.

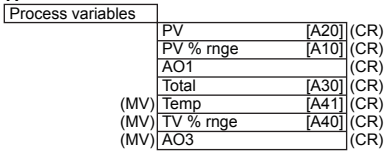
• DD (HART 5) Menu Tree

F0805.ai

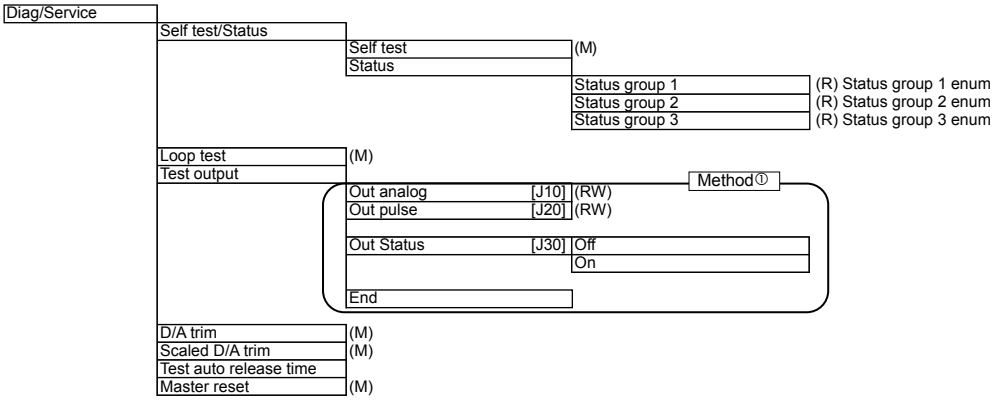
(R) Read only
(CR) Continuous read
(RW) Read and Write
(M) Method of HCF
Unique Method of DY
(MV) Only for Multi-Variable Type

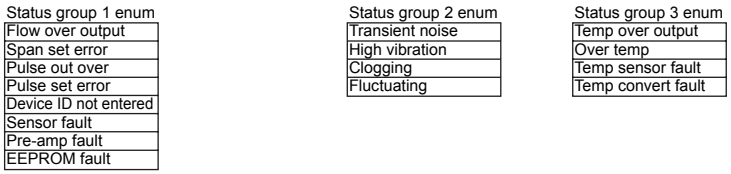
[ ] Parameter No. in display and BRAIN Terminal
* Upload/Download
☆ Device revision 4.0 or later

A



B





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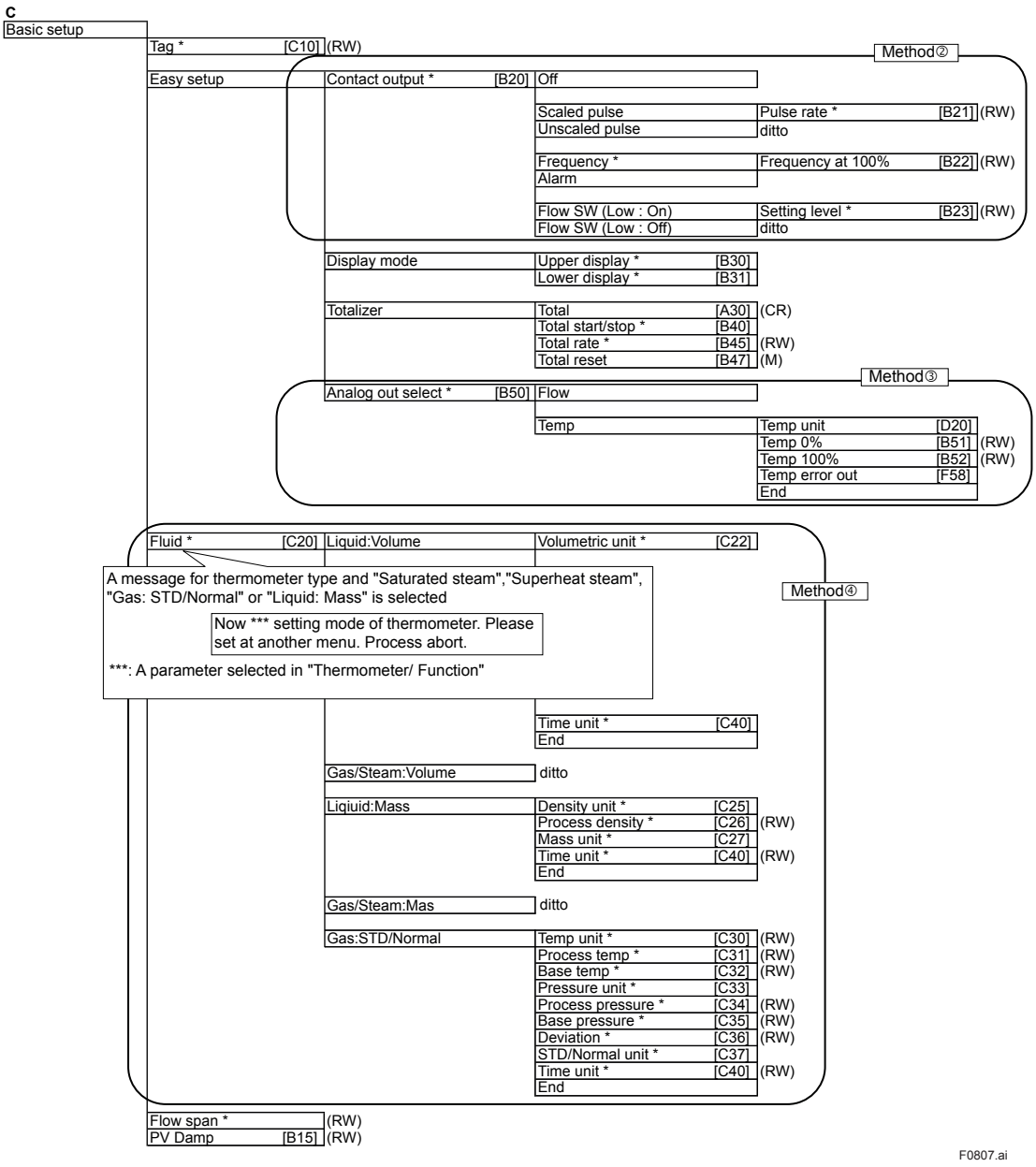
(R) Read only
(CR) Continuous read
(RW) Read and Write
(M) Method of HCF
Unique Method of DY
(MV) Only for Multi-Variable Type

[ ] Parameter No. in display and BRAIN Terminal
* Upload/Download



F0807.ai

(R) Read only
(CR) Continuous read
(RW) Read and Write
(M) Method of HCF
Unique Method of DY
(MV) Only for Multi-Variable Type

[ ] Parameter No. in display and BRAIN Terminal
* Upload/Download
☆ Device revision 4.0 or later

D

- Detailed setup
  - Characterize meter
    - Nominal size * [E10] (RW)
    - Body type * [E20] (RW)
    - Sensor type * [E30] (RW)
    - K-factor setup
      - K-factor unit * [E40] (RW)
      - K-factor * [E41] (RW)
    - Detector No. * (RW)
  - PV units
    - Fluid * [C20] Method④
    - Special unit * [D40]
      - No
      - Yes
        - Base unit * [D41] (R)
        - User's unit * [D42] (RW)
        - Conversion factor * [D43] (RW)
        - End
      - Special ☆
        - Base unit * (R)
        - User's unit * (RW)
        - Conversion factor * (RW)
        - End

      Method⑤
  - Configure outputs
    - Analog outputs
      - Flow span * [B10] (RW)
      - Out limit(H) * [D30] (RW)
      - Burn out [D35] (R)
    - Contact output * (M)
    - Display mode
      - Upper display [B30] (RW)
      - Lower display [B31] (RW)
    - Totalizer
      - Total [A30] (CR)
      - Total start/stop [B40] (RW)
      - Total rate [B45] (RW)
      - Total reset [B47] (M)
    - HART output
      - Poll addr (RW)
      - Num req preams (R)
      - Burst mode (RW) Burst mode enum
      - Burst option (RW) Burst option enum

To be continued to next page (**D1**)

Burst mode enum

Off
On

Burst option enum

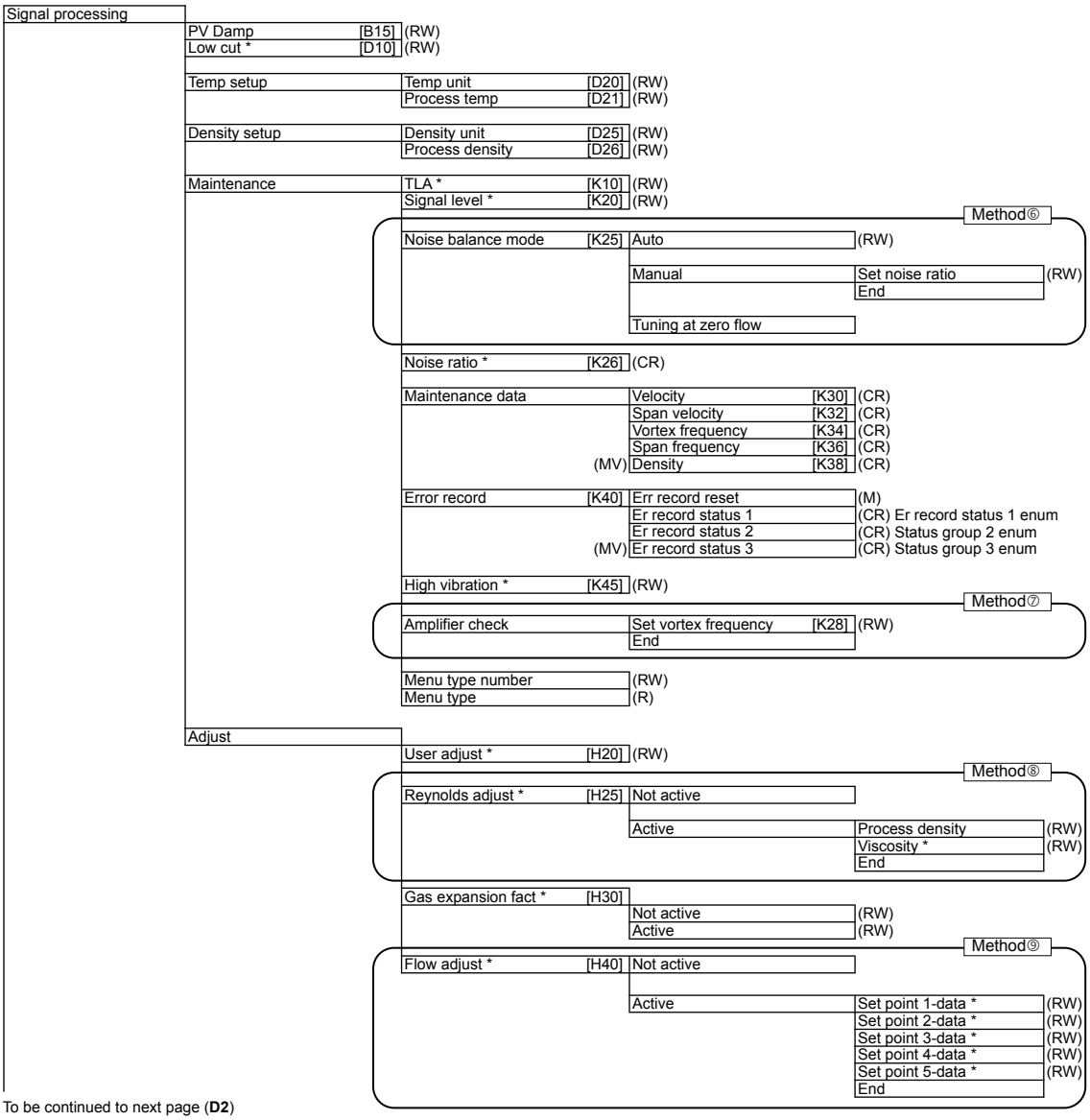
PV
%range/current
Process vars/crnt

F0808.ai

(R) Read only
(CR) Continuous read
(RW) Read and Write
(M) Method of HCF
Unique Method of DY
(MV) Only for Multi-Variable Type

[ ] Parameter No. in display and BRAIN Terminal
* Upload/Download
☆ Device revision 4.0 or later

D1



To be continued to next page (**D2**)

Er record status 1 enum

Flow over output
Span set error
Pulse out over
Pulse set error
Sensor fault
Pre-amp fault
EEPROM fault

F0809.ai

(R) Read only
(CR) Continuous read
(RW) Read and Write
(M) Method of HCF
Unique Method of DY
(MV) Only for Multi-Variable Type

[ ] Parameter No. in display and BRAIN Terminal
* Upload/Download
☆ Device revision 4.0 or later

D2

- Device information
  - Manufacturer (R)
  - Tag * (RW)
  - Descriptor * (RW)
  - Message * (RW)
  - Date * (RW)
  - Write protect (R)
  - Revision numbers
    - Universal rev (R)
    - Fld dev rev (R)
    - Software rev (R)
    - Hardware rev (R)
    - Final asmbly num (R)
    - Dev id (R)
    - Next universal rev (R) ☆
    - Chng universal rev (M) ☆
- (MV) Thermometer
  - Function * [F10] — Method⑩
    - Monitor only
    - Saturated steam
      - Mass unit [F12] (RW)
      - Time unit [F35] (RW)
      - End
    - Superheat steam
      - Pressure unit [F14] (RW) Pressure unit enum
      - Process pressure [F15] (RW)
      - Mass unit [F16] (RW)
      - Time unit [F35] (RW)
      - End
    - Gas:STD/Normal
      - Temp unit [F18] (RW)
      - Base temp [F19] (RW)
      - Pressure unit [F20] (RW) Pressure unit enum
      - Process pressure [F21] (RW)
      - Base pressure [F22] (RW)
      - Deviation [F23] (RW)
      - STD/Normal unit [F24] (RW)
      - Time unit [F35] (RW)
      - End
    - Liquid:Mass
      - Density unit [F26] (RW)
      - Base density * [F27] (RW)
      - Temp unit [F28] (RW)
      - Base temp [F29] (RW)
      - 1'st temp coeff * [F30] (RW)
      - 2'nd temp coeff * [F31] (RW)
      - Mass unit [F32] (RW)
      - Time unit [F35] (RW)
      - End
    - Not use
  - Cable length * [F52] (RW)
  - Temp damping * [F50] (RW)
  - Analog out select * [F55] Method③

E

- Review
  - Review 1
  - Review 2
  - Review 3
  - (MV) Review 4

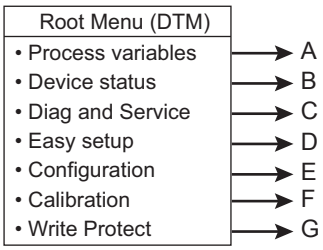
Pressure unit enum
- MPa abs
- kPa abs
- kg/Sqcm abs
- bar abs
- psia

F0810.ai

Review 1	Review 2	Review 3	Review 4
Model	Flow rate unit	Special unit	Function
Manufacturer	Flow span	User's unit	Base density
Distributor	PV Damp	Conversion factor	1'st temp coeff
Tag	Contact output	Nominal size	2'nd temp coeff
Descriptor	Pulse rate	Body type	Cable length
Message	Frequency at 100%	Sensor type	Temp damping
Date	Setting level	K-factor	Analog out select
Dev id	Upper display	Detector No	Temp 0%
Write protect	Lower display	User adjust	Temp 100%
AO Alrm typ	Total rate	Reynolds adjust	Temp error out
Universal rev	Total start/stop	Viscosity	(Only for /MV)
Fld dev rev	Fluid	Gas expansion fact	
Software rev	Process density	Flow adjust	
Hardware rev	Process temp	TLA	
Poll addr	Base temp	Signal level	
Burst mode	Process pressure	Noise balance mode	
Burst option	Base pressure	Noise ratio	
Num req preams	Deviation	High vib.	
	Low cut	Span velocity	
	Out limit (H)	Span frequency	
	Burn out		

F0811.ai

• DTM (HART 5) Menu Tree



F0812.ai

(R) Read only
(CR) Continuous read
(RW) Read and Write
(M) Method of HCF
Unique Method of DY
(MV) Only for Multi-Variable Type

[ ] Parameter No. in display and BRAIN Terminal
* Upload/Download
☆ Device revision 4.0 or later

A

Process Variables			
	PV	[A20]	(R)
	PV % rng	[A10]	(R)
	AO1		(R)
	Flow span	[B10]	(R)
	PV damp	[B15]	(R)
	Total	[A30]	(R)
(MV)	Temp	[A41]	(R)
(MV)	TV % rnge	[A40]	(R)
(MV)	AO3		(R)
(MV)	Temp 0%	[B51]	(R)
(MV)	Temp 100%	[B52]	(R)
(MV)	Temp damping	[F50]	(R)

B

Device Status				
Process Variables				
	PV	[A20]	(R)	
	PV % rnge	[A10]	(R)	
(MV)	TV % rnge	[A41]	(R)	
(MV)	Temp	[A40]	(R)	
Diagnostic List				
	Device Status		(R)	
	Status group1		(R)	Status group 1 enum
	Status group2		(R)	Status group 2 enum
(MV)	Status group3		(R)	Status group 3 enum

C

Diag and Service				
	Loop test		(M)	
	Loop test pulse/status		(M)	
	Amplifier check		(M)	
	Test auto release time	[J40]	(RW)	☆
	Master reset		(M)	
	Error Record			
	Er record status 1		(R)	Er record group 1 enum
	Er record status 2		(R)	Status group 2 enum
	Er record status 3		(R)	Status group 3 enum

D

Easy Setup			
	Tag		(RW)
	Contact output	[B20]	(R)
	Contact output		(M)
	Pulse rate	[B21]	(R)
	Freq at 100%	[B22]	(R)
	Setting level	[B23]	(R)
	Flow span	[B10]	(RW)
(MV)	Analog out select	[B50]	(R)
(MV)	Analog out select		(M)
	Temp 0%	[B51]	(R)
	Temp 100%	[B52]	(R)
	PV Damp	[B15]	(RW)
(MV)	Temp damping	[F50]	(RW)
	Total rate	[B45]	(RW)
	Upper display	[B30]	(RW)
	Lower display	[B31]	(RW)

F0813.ai

E

Configuration				
Meter				
	Nominal size	[E10]	(RW)	
	Body type	[E20]	(RW)	
	Sensor type	[E30]	(RW)	
	K-factor unit	[E40]	(RW)	
	K-factor	[E41]	(RW)	
	Detector No	[E50]	(RW)	
	Cable length	[F52]	(RW)	
	Upper display	[B30]	(RW)	
	Lower display	[B31]	(RW)	
Flow Setting				
	Sensor status		(R)	
(MV)	Function		(R)	
(MV)	Function		(M)	
	Fluid		(R)	
	Fluid		(M)	
	Indicate parameter depends on the choice in 'Fluid/Function'.			
Special Units				
	Special unit	[D40]	(R)	
	Special unit		(M)	
	Base unit	[D41]	(R)	
	User's unit	[D42]	(R)	
	Conversion factor	[D43]	(R)	
Total				
	Total	[A30]	(R)	
	Total start/stop	[B40]	(RW)	
	Total rate	[B45]	(RW)	
	Total reset		(M)	
Adjust				
	User adjust	[H20]	(RW)	
	Raynolds adjust	[H25]	(R)	
	Raynolds adjust		(M)	
	Process density	[K36]	(R)	
	Gas expansion fact	[H30]	(RW)	
	Flow adjust	[H40]	(R)	
	Flow adjust		(M)	
	Indicate parameter only when 'Flow adjust' is activated.			
Maintenance				
	Lowcut	[D20]	(RW)	
	TLA	[K10]	(RW)	
	Signal level	[K20]	(RW)	
	Noise balance mode	[K25]	(R)	
	Noise balance mode		(M)	
	Noise ratio	[K26]	(R)	
	High vibration	[K45]	(RW)	
	Velocity	[K30]	(R)	
	Span Velocity	[K32]	(R)	
	Vortex frequency	[K34]	(R)	
	Span frequency	[K36]	(R)	
	Menu type number		(RW)	
Analog Output				
	Flow span	[B10]	(RW)	
	PV Damp	[B15]	(RW)	
	AO Arlm typ		(R)	
	Out limit(H)	[D30]	(RW)	
(MV)	Analog out select	[B50]	(R)	
(MV)	Analog out select		(M)	
(MV)	Temp damping	[F50]	(RW)	
Device information				
	Model		(R)	
	Manufacturer		(R)	
	Hardware rev		(R)	
	Software rev		(R)	
	Descriptor		(RW)	
	Massage		(RW)	
	Date		(RW)	
	Final asmbly num		(RW)	
HART				
	Tag		(RW)	
	Poll addr		(RW)	
	Dev id		(R)	
	Universal rev		(R)	
	Fld dev rev		(R)	
	Next universal rev		(R)	☆
	Chng universal rev		(M)	☆
	Num req preams		(R)	
	Physical signl code		(R)	
	Burst mode		(RW)	Burst mode enum
	Burst option		(RW)	Burst option enum

F

Calibration		
D/A trim		(M)
Scaled D/A trim		(M)

G

Write Protect		
write protect		(M)
Software seal		(R)

F0814.ai

9. OPERATION VIA HART CONFIGURATION TOOL (HART 7)

NOTE

In this User's Manual, HART protocol revision 5 and 7 are described as HART 5 and HART 7 respectively.

Note: HART is a registered trademark of the HART Communication Foundation (HCF).

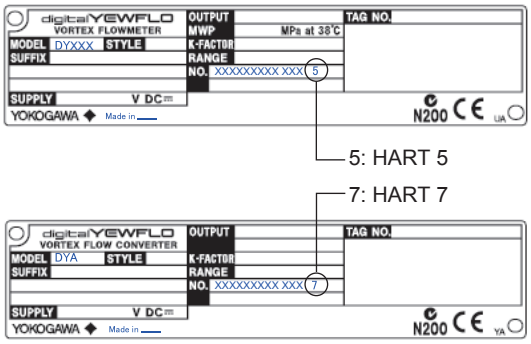
9.1 HART Protocol Revision

For the models with the output signal code "-J", HART protocol revision 5 or 7 is selectable. The protocol revision is set as specified in the order.

- Confirmation by the name plate
  The HART protocol revision is shown by the last number of the serial number.

In the case of the communication code "-J"

The HART protocol revision is shown by the last number of the serial number.



F0901.ai

Figure 9.1 Name Plate

9.2 HART Configuration Tool and Matching of Device Revision

Before using the HART Configuration Tool (such as FieldMate), confirm that the DD (Device Description) of the digitalYEWFLO is installed in the Configuration Tool before using.

DY and DYA HART 7;

Device type: 0x370B, Device revision: 10

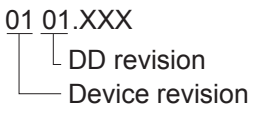
IMPORTANT

Protocol revision supported by HART configuration tool must be the same or higher than that of the device.

	Protocol Rev. supported by HART configuration tool	
	5	7
DY or DYA HART 5	Available	Available
DY or DYA HART 7	Not available	Available

The DD revisions for digitalYEWFLO and Configuration Tool's can confirm in accordance with the following steps.
If the correct DD is not installed in the HART Configuration Tool, download them from the official HART programming sites, otherwise, contact the respective vendors of the Configuration Tool for its upgrade information.

1. Confirmation of the device revision for digitalYEWFLO
   - Procedure to callup the field device revision; **[Root Menu]** → Review → Review1
   - 'Fld dev rev' in the Review1 shows the revision number of correspondent field device.
2. Confirmation of the device revision for the HART Configuration Tool
   (1) Confirm the installed DD revision in accordance with the procedure of the Configuration Tool. Refer to its manual how to confirm it in detail.
   The first 2 digits of the DD file are expressed the device revision, and its last 2 digits are expressed the DD revision.



F0902.ai

9.3 Setting Parameters using DTM

When configure the parameters using FieldMate, use the DTM (Device Type Manager) reffering to the following table.

DTM Name	Device Type	Device Revision
DYF HART 7 DTM	0 x 370B	10

9.4 Interconnection between digitalYEWFLO and HART Configuration Tool

The HART Configuration Tool can interface with the digitalYEWFLO from the control room, the digitalYEWFLO site, or any other wiring termination point in the loop, provided there is a minimum load resistance of 250 Ω between the connection and the receiving instrument. To communicate, it must be connected in parallel with the digitalYEWFLO, and the connections must be non-polarized. Figure 9.2 illustrates the wiring connections for a direct interface at the digitalYEWFLO site. The HART Configuration Tool can be used for remote access from any terminal strip as well.

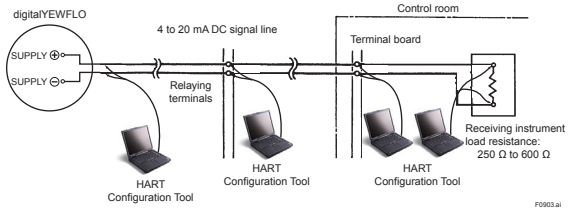


Figure 9.2 Connecting the HART Communicator

WARNING

Be sure to set parameters as “Protect” on the write protect function after finish of parameter setting work.
Refer to Section 9.9 “Software Write Protect” how to use the write protect function in detail.

IMPORTANT

If the power of flowmeter is turned off within 30 seconds after parameters have been set, these settings will be canceled. Accordingly, please keep the power on for at least 30 seconds after setting parameters.

NOTE

Before updating any setting, remember to always check the data content you want to change as described in Section 6.4 “Parameters Description”.

9.5 Basic Setup

■ Tag and Device Information

The tag number and device information can be checked as follows:

- Procedure to call up the tag number and device information

Tag	**[Root Menu]** → Basic setup → Tag or **[Root Menu]** → Detailed setup → Device information → Tag or **[Root Menu]** → Review → Review1 → Tag
Long Tag	**[Root Menu]** → Basic setup → Long Tag or **[Root Menu]** → Detailed setup → Device information → Long Tag or **[Root Menu]** → Review → Review1 → Long Tag
Descriptor	or **[Root Menu]** → Detailed setup → Device information → Descriptor or **[Root Menu]** → Review → Review1 → Descriptor
Message	or **[Root Menu]** → Detailed setup → Device information → Message or **[Root Menu]** → Review → Review1 → Message
Date	or **[Root Menu]** → Detailed setup → Device information → Date or **[Root Menu]** → Review → Review1 → Date

When changing the tag number or device information, enter the information directly within the following limitations.

Item	Limitations
Tag	Up to 8 characters or numbers*1
Long Tag (HART 7 only)	Up to 32 characters or numbers*2
Descriptor	Up to 16 characters or numbers*1
Message	Up to 32 characters or numbers*1
Date	yyyy/mm/dd - mm : month (2 digits) - dd : days (2 digits) - yy : years (2 digits)

*1: The characters bounded by the thick line in the following table can be used.
*2: All characters in the following table can be used.

SPACE	!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	

F0904.ai

9.6 Parameter Setting

The parameter structure of the HART configuration tool is hierarchical.
Refer to Section 9.11 “Menu Tree (HART 7)” for the corresponding parameters. The menu tree shows a cross-reference of the parameters for HART configuration Tool and BRAIN Terminal.
Refer to Section 6.4 “Parameters Description” for the functions of parameters.
Note that some display parameters of digitalYEWFLO are different from those of HART Configuration Tools.

9.7 Data Renewing and Upload/ Download function

(1) Data renewing
Following data are renewed in 0.5 to 2 seconds cycle.
PV, PV%, rnge, Loop Current, Total
Temp, TV% rnge, : only for /MV

(2) Upload/download function
Upload/download parameters from digitalYEWFLO to the HART Configuration Tool.
Refer to Section 9.11 “Menu Tree (HART 7)” for the applicable parameters.

9.8 Self-Diagnostic

The self-diagnostic function of the digitalYEWFLO is explained in Section 6.5 “Self-Diagnostic (Error Code List)”.
The followings are additional items of the self-diagnostic function.

- Burst configuration error: Burst mode setting error.
- Device variable simulation: Executing Device variable simulation function.

The HART configuration tool is able to execute METHOD (*) of 'Self test/Status'. Confirm the error.

- Procedure to call up the Self test/Status;

[Root Menu] → Diag/Service → Self test/Status

(*) ‘Method’ is a program to faciliate the parameter settings.

9.9 Software Write Protect

digitalYEWFLO configured data is saved by using a write protect function. The write protect status is set to “Yes” when 8 alphanumeric characters are entered in the **New password** field and transferred to the device. When write protect is set to “Yes,” the device does not accept parameter changes. When the same eight alphanumeric string entered in the **New password** field is also entered in the **Enable wrt 10min** field and transferred to the digitalYEWFLO, it will be possible to change device parameters during a 10 minute period.
To change the digitalYEWFLO from the write protect “Yes”status back to Write protect “No” status, use **Enable wrt 10min** to first release the write protect function and then enter eight spaces in the **New password** field.

9.10 Specific Functions of HART Configuration Tool

9.10.1 Process Variable Setup (Dynamic Variables)

The device deals with four data (flow rate, temperature, density and total flow rate). In case of /MV, these four data are allocated to PV(Primary Variable), SV(Secondary Variable), TV(Tertiary Variable) and QV(Quaternary Variable). The variable of PV is 4 to 20mA current output. Therefore, the total flow rate do not allocate to PV. (Except /MV, each dynamic variables are fixed at factory setting.)

Dynamic Variable	Choice items	Factory Setting
PV	Flow rate, Temperature	Instantaneous Flowrate
SV	Flow rate, Total, Temperature, Density	Total Flowrate
TV	Flow rate, Total, Temperature, Density	Fluid Temperature
QV	Flow rate, Total, Temperature, Density	Fluid Density

- Procedure to call up the Dynamic variable assignments.

[Root Menu] → Detailed setup → Configure outputs → HART output →

Dynamic variable assignments
- → PV is
- → SV is
- → TV is
- → QV is
- → Chng dyn var assign (METHOD)

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Update time period of each measurement value is as follows;

- Flow rate: Flow rate Update time period
- Total: Total Update time period
- Temperature: Temperature Update time period
- Density: Density Update time period

9.10.2 Burst Mode

When the **Burst mode** is enabled, the device continuously sends up to three data listed in Table 9.1.
When the **Burst mode** is set to “Wired HART Enabled”, the device continuously sends alarm signal also.
Refer to Subsection 9.10.3 “Event Notification” for detail.
When changing the setting of **Burst mode**, set “Off” to the **Burst mode**. Default setting is “Off”.

(1) Burst Message

The parameters for Burst Message are as follows.

- Transmit data: command parameters of Burst Command
- Device variables:
- Update period
- Transmit condition: choice in Burst Msg Trigger Mode
  Refer to Table 9.1 for the combination between command parameter and transmit condition.
  [Root Menu] → Detailed setup → Configure outputs → HART output → Burst Condition → Burst Message1, 2, 3 → Burst command

NOTE

- In case of Burst Mode setting change, confirm Burst Mode parameter is OFF.
- Prioritize to use the 'Burst Message 1'.

Table 9.1 Burst parameters

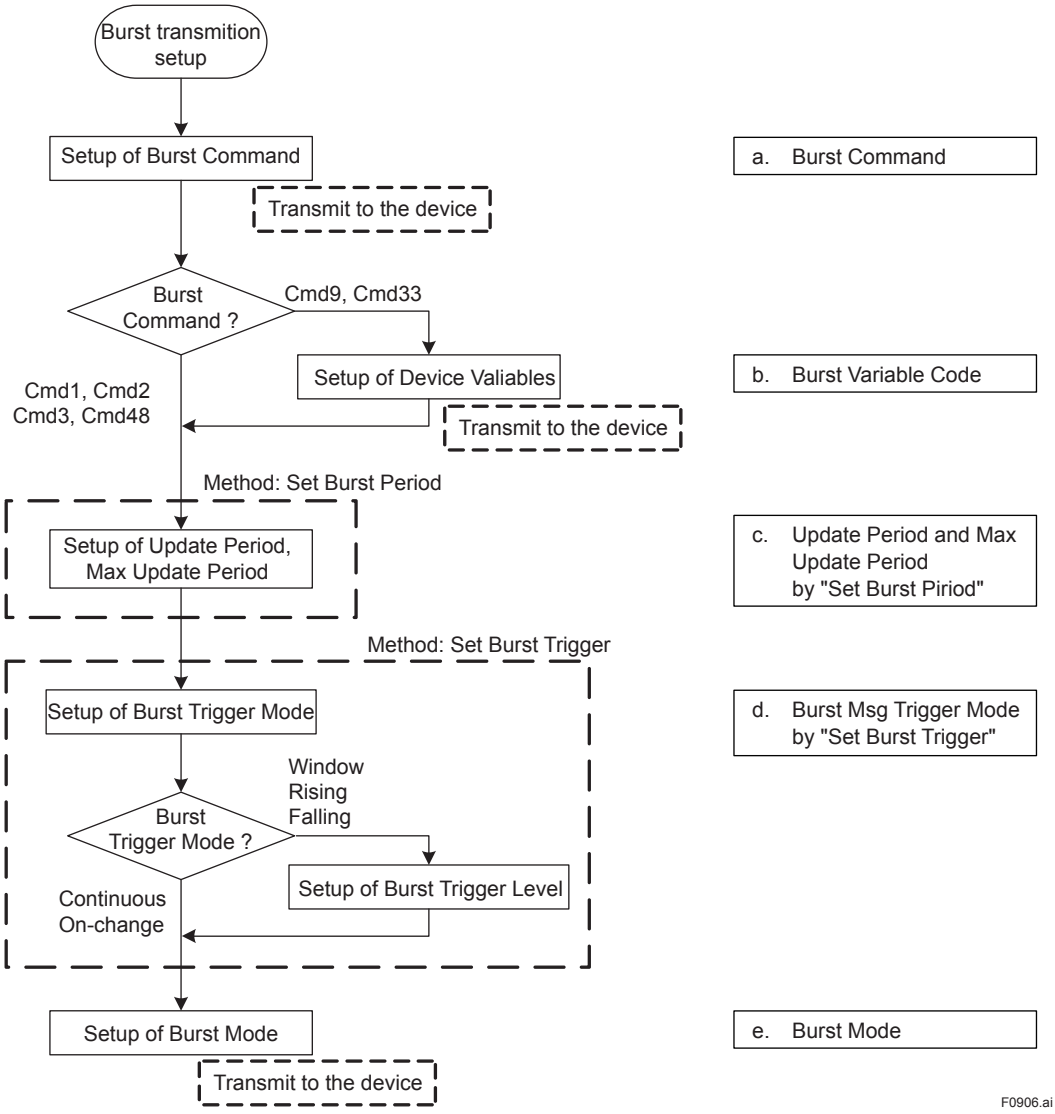
Command parameter	Burst Command	Burst Msg Trigger Mode	Burst Trigger Source	Burst Trigger Units
PV (flow rate)	Cmd1:PV	Continuous	—	—
		Window	PV	Depends on the assigned variable to PV
		Rising		
		Falling		
		On-change		
% range/current (Percent of range, Loop current)	Cmd2:% range/ current	Continuous	—	—
		Window	% range	%
		Rising		
		Falling		
		On-change		
Process vars/current (Loop current, PV, SV, TV, QV)	Cmd3:Dyn vars/ current	Continuous	—	—
		Window	PV	Depends on the assigned variable to PV
		Rising		
		Falling		
		On-change		
Process vars/%range/current with status*1 (Select from flow rate, total flow, temperature, density, percent of range, loop current, PV, SV, TV, and QV)*2	Cmd9:Device vars w/ Status	Continuous	—	—
		Window	Top of Burst Device Variables	Depends on maapping
		Rising		
		Falling		
		On-change		
Process vars/%range/current (Select from flow rate, total flow, Temperature, Density, percent of range, loop current, PV, SV, TV, and QV)*2	Cmd33:Device Variables	Continuous	Top of Burst Device Variables	Depends on the assigned variable to Burst Device Variable
		Window		
		Rising		
		Falling		
		On-change		
Self diagnosis information	Cmd48:Read Additional Device Status	Continuous	—	—
		On-change	All status	—

*1: Output the data with time and status.
*2: Select at **Burst Device Variables**

(2) Burst mode setting procedure

- Procedure to call up the display

DD (HART 7) DTM (HART 7)	**[Root Menu]** → Detailed setup → Configure outputs → HART output → Burst Condition → Burst Message 1,2 or 3 → Burst Command



a. Burst Command

Select the transmission data at **Burst Command** parameter.

Burst Command	Command parameter
Cmd1:PV	Variable assigned to PV
Cmd2:% range/current	% range/current (Percent of rang, Loop current)
Cmd3:Dyn vars/current	Process vars/current (Loop current, PV, SV, TV, QV)
Cmd9:Device vars w/Status	Process vars/% range/current Mapping by user
Cmd33:Device Variables	Process vars/% range/current Mapping by user
Cmd48:Read Additional Device Status	Self diagnosis information

b. Burst Variable Code

This parameter is possible to be set when **Burst Command** is Cmd9:Device vars w/Status (up to eight items) and Cmd33: Device Variables (up to four items).
Set device variables to a bare minimum to avoid to get the communication time longer.

- Procedure to call up the display

DD (HART 7) DTM (HART 7)	**[Root Menu]** → Detailed setup → Configure outputs → HART output → Burst Condition → Burst Message1, 2 or 3 → Burst Device Variables → Burst Variable Code →
Display Item	Contents
Flowrate	Flowrate
Total	Total flow
Temperature	Temperature
Density	Density
%rnge	Select the % output
Loop current	Select the output current
PV	Select the PV value
SV	Select the SV value
TV	Select the TV value
QV	Select the QV value
Not use	–

c. Update Period and Max Update Period

Set to **Update Period** and **MaxUpdate Period**.
Set greater value of update period than a value which is set in each process value.
For **Update Period**, set the value that is smaller than **Max Update Period**.

- Procedure to call up the display

DD (HART 7) DTM (HART 7)	**[Root Menu]** → Detailed setup → Configure outputs → HART output → Burst Condition → Burst Message1, 2 or 3 → Set Burst Period →
→ **Update Period** /Max Update Period	0.5 s
	1 s
	2 s
	4 s
	8 s
	16 s
	32 s
	1 min
	5 min
	10 min
	15 min
	30 min
	45 min
	60 min

d. Burst Msg Trigger Mode

Set The **Burst Msg Trigger Mode** from the parameters shown below.
When **Burst Msg Trigger Mode** is Window, Rising or Falling, set the **Burst Trigger Level**.

- Procedure to call up the display

DD (HART 7) DTM (HART 7)	**[Root Menu]** → Detailed setup → Configure outputs → HART output → Burst Condition → Burst Message1, 2 or 3 → Set Burst Trigger →
Display Item	Contents
Continuous	Burst Message is transmitted contiuously.
Window	It detects that the absolute value of the amount of change of a device variable value became beyond the preset value of Burst Trigger Level, and transmits.
Rising	It detects that the device variable value became beyond the preset value of Burst Trigger Level, and transmits.
Falling	It detects that the device variable value turned into below the preset value of Burst Trigger Level, and transmits.
On-change	It detects that the device variable value changed and transmits.

*1: Check transmitting conditions with the cycle set as Update Period, and when it corresponds to conditions, they transmit. Moreover, even if it does not correspond to conditions, it transmits compulsorily with the cycle set up by Max Update Period.

e. Burst Mode

When the **Burst mode** is set to Wired HART Enabled, the device starts to send the data.

- Procedure to call up the display

[Root Menu] → Detailed setup → Configure outputs → HART output → Burst condition → Burst Message1, 2 or 3 → Burst mode → Wired HART Enabled

9.10.3 Event Notification

When a setting change and a change of the Self-diagnostics occur, device detect it as an event and can transmit an alarm signal continuously.
Alarm contained in the following item can be set to Event, and can be detected.

- Device Status
- Status group 1 to 3
- Ext dev status
- Device diagnostic status 0

Up to four events that occurred can be stored.
When using this function, set to **Burst mode** as "Wired HART Enabled".

(1) Set Event Notification

- Procedure to call up the display

DD (HART 7) DTM (HART 7)	**[Root Menu]** → Detailed setup → Configure outputs → HART output → Event Notification
→ Event Notification Control	Stop the event monitor: OFF Shift to the monitor state: Enable event notification on token-passing data link layer
→ Event Mask	Set the status to detect
→ Event Notification Retry Time	Set the retry time when the event occur.
→ Max Update Time	Set the retry time when the event does not occur.
→ Event Debounce Interval	The setting of the minimum event duration

a) Event Mask

Set the status to detect in the **Event Mask** parameter.

Device Status Mask
Status group 1 to 3
Ext dev status Mask
Device Diagnostic Status 0 Mask

b) Event Notification Retry Time/ Max Update Time/ Event Debounce Interval

Set to Event Notification Retry Time, Max Update Time and Event Debounce Interval.
For **Event Noteification Retry Time**, set the value thet is smaller than **Max Update Time**.

Event Notification Retry Time/Max Update Time	Event Debounce Interval
—	Off
0.5 s	0.5 s
1 s	1 s
2 s	2 s
4 s	4 s
8 s	8 s
16 s	16 s
32 s	32 s
1 min	1 min
5 min	5 min
10 min	10 min
15 min	15 min
30 min	30 min
45 min	45 min
60 min	60 min

c) Event Notification Control

Select "Enable event notification on token-passing data link layer" in the **Event Notification Control** parameter to shift to the monitor state:

(2) Acknowledge Event Notification (DTM)

The transmission of the event message stops when event is approved.

- Procedure to call up the display

DTM (HART 7)	**[Root Menu]** → Detailed setup → Configure outputs → HART output → Event Notification → Knowledge →
→ Acknowledge Event Notification	Acquisition of the event number and approval.

a) Get Event Number

Confirm the latest event number.
Execute **Acknowledge Event Notification** method.

1) Set "0" to enter Event Number.
2) OK.
3) Set "Trans 0: Read Event Notification" to Select Transaction.
4) OK.
5) Confirm Event Number.

b) Acknowledge Event Notification

Execute **Acknowledge Event Notification** method.

1) Set the event number which is confirmed in a)5 to enter Event Number.
2) OK.
3) Set “Trans 1: Send Acknowledge” to Select Transaction.
4) OK.
5) Confirm Event Status is 0x00.

(3) Event Notification Record (DTM)

- Procedure to call up the display

DTM (HART 7)	**[Root Menu]** → Detailed setup → Configure outputs → HART output → Event Notification → Knowledge →
→ Acknowledge Event Notification	Acquisition of the event number and approval.

a) Get Event Number

Confirm the latest event number.
Execute **Acknowledge Event Notification** method.

1) Set “0” to enter Event Number.
2) OK.
3) Set “Trans 0: Read Event Notification” to Select Transaction.
4) OK.
5) Confirm Event Number.

b) Confirmation record of Event Notification

Confirm four events checked in a).

1) Set the event number which is confirmed in a)5 to enter Event Number.
2) OK.
3) Set “Trans 0: Read Event Notification” to Select Transaction.
4) OK.
5) Knowledge menu displays events record.

Ex.) When the confirmed event number is 123.

Event Number	Explanation
123	The latest event
122	An event before the once.
121	An event before the twice.
120	An event before three times.

9.10.4 Multidrop Mode

“Multidroping” devices refer to the connection of several devices to a single communication transmission line. Up to 63 devices can be connected when set in the multidrop mode. To activate multidrop communication, the device address must be changed to a number from 1 to 63. If it sets to multidrop mode, in order to transmit all the data in digital one, it is necessary to change a setup of the analog signal output of four to 20 mA.

Setting of Multidrop Mode

(1) Polling address

- Procedure to call up the display

DD (HART 7) DTM (HART 7)	**[Root Menu]** → Detailed setup → Configure outputs → HART output →
→ Poll addr	Enter the number from 1 to 63

(2) Enabling the Multidrop Mode

About the procedure to call up the **Polling** display, refer to the User’s Manual of each configuration tool.

Usually, set Disable to Loop current mode and fix an analog output signal to 4mADC. It becomes impossible in this case, to also use a burnout output.

However, in the case of the application which receives and operates an analog output signal, an analog output signal can be used for one loop to variable one set, setting it up. In this case, set Enable to Loop current mode.

- Procedure to call up the display

DD (HART 7) DTM (HART 7)	**[Root Menu]** → Detailed setup → Configure outputs → Analog output → Loop current mode →
Enabled	Loop current mode is enabled.
Disabled	Loop current mode is disabled.

NOTE

When the same polling address is set for two or more devices in multidrop mode, communication with these devices are disabled.

(3) Communication when set in the multidrop mode.

- The HART configuration tool searches for a device that is set in multidrop mode when it is turned on. When the HART configuration tool is connected to the device, the polling address and the tag will be displayed.
- Select the desired device. After that, normal communication to the selected device is possible. However, the communication speed will be slow.

(4) Release the Multidrop Mode
To release multidrop mode, call up the **Poll addr** display and set the address to "0".
Return Loop current mode to Enable.

9.10.5 Loop Test, Simulation, and Squawk

(1) Loop test

This feature can be used to output a fixed current for loop checks.

- Procedure to call up the Loop test (Method)

[Root Menu] → Diag/Service → Loop test

(2) Device Variable Simulation Function (Effective only when setting to HART 7)

Using the simulation function, the output signal can be confirmed by setting any value and status to the selected device variable.
Call up the parameter (Method) and follow the message shown.
After completing the step 5 in the next table, the simulation starts.

- Procedure of device variable simulation

step1	Call up the parameter	**[Root Menu]** → Diag/Service → Simulate (M)
2	Selection of Device Variable	Select one parameter from the list below Off Flow rate Total Temperature Density Percent range Loop Current
3	Setting of Value	Input the simulate value
4	Setting of Data quality	Select one parameter from the list below Bad Poor accuracy Manual / Fixed Good
5	Setting of Limit status	Select one parameter from the list below Not limited Low limited High limited Constant

NOTE

- The simulations act on current, LCD display, communication and alarm.
- The simulation of total flow rate acts on LCD display and communication, not on measuring total flow rate.
  The measuring total flow rate is continuosly working during simulation.

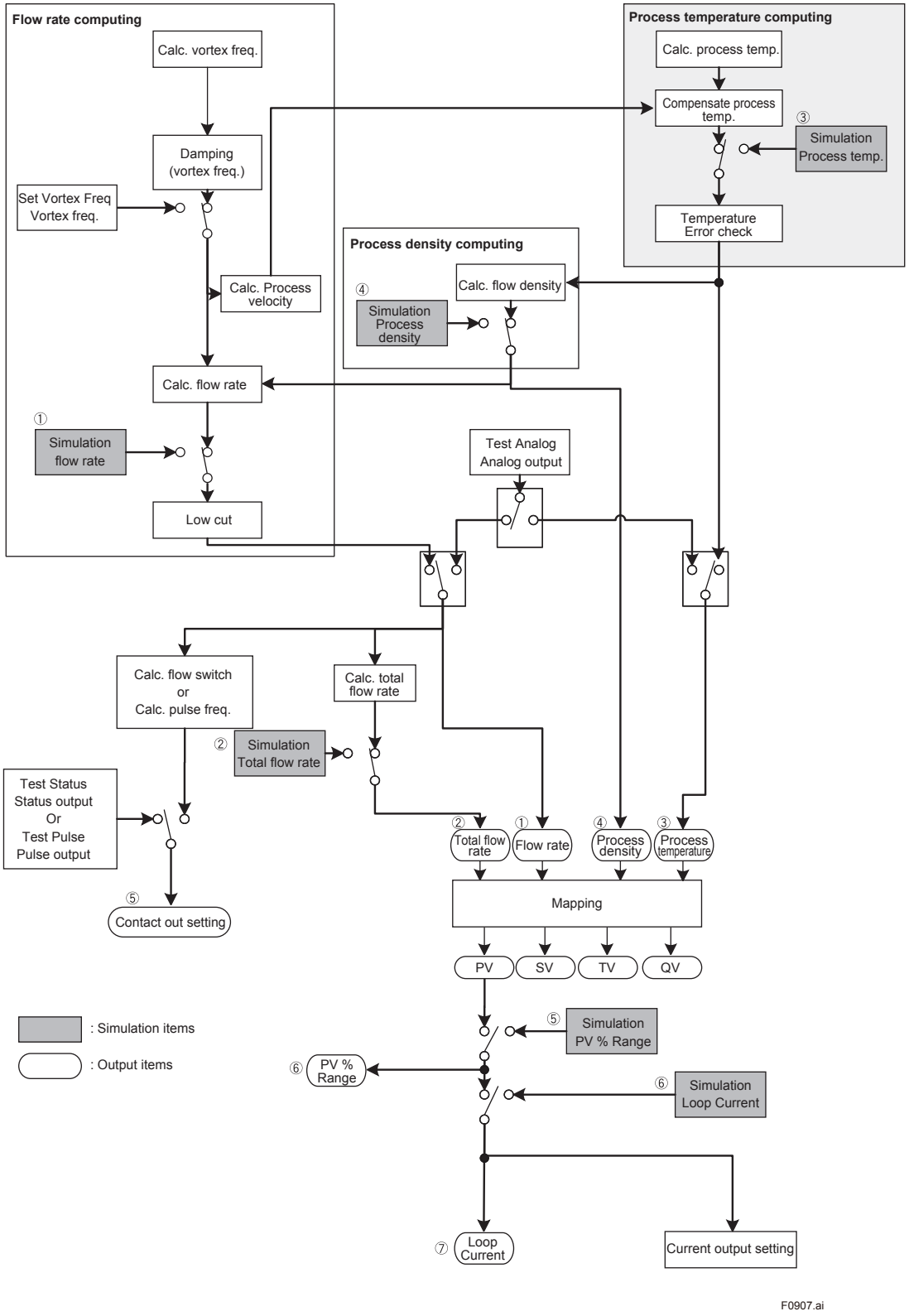


Figure 9.3 Simulation Flow

- Simulation Setting and Correlation of Output Value

<Case A>: Without option code /MV

Simulation Setting value	Output value						
	Flow rate①	Total flow rate②	Process temperature③	Process density④	Contact output⑤	PV % Range⑥	Loop Current⑦
Flow rate	Yes	Yes	No	No	Yes	Yes	Yes
Total flow rate	No	Yes	No	No	No	No	No
Process temperature	No	No	Yes	No	No	No	No
Process density	No	No	No	Yes	No	No	No
PV % Range	No	No	No	No	No	Yes	Yes
Loop Current	No	No	No	No	No	No	Yes

Yes : Simulation value or calculation result of Simulation.
No : Actual process value or parameter setting value.

<Case B>: With option code /MV
<Case B-1>: Function == “Monitor only”
<Case B-2>: Function == “Saturated Steam” or “Superheat Steam” or “LIQUID:Mass”
<Case B-3>: Function == “Gas:STD/Normal”
<Case B-4>: Function == “Not use”

Simulation Setting value	Output value				
	Flow rate	Total flow rate	Process temperature	Process density	Contact output
Flow rate	Yes	Yes	No	No	Yes
Total flow rate	No	Yes	No	No	No
Process temperature	<Case B-1, 4> No	<Case B-1, 4> No	Yes	<Case B-1, 2> Yes	<Case B-1, 4> No
	<Case B-2, 3> Yes	<Case B-2, 3> Yes		<Case B-3, 4> No	<Case B-2, 3> Yes
Process density	<Case B-1, 3, 4> No	<Case B-1, 3, 4> No	No	Yes	<Case B-1, 3, 4> No
	<Case B-2> Yes	<Case B-2> Yes			<Case B-2> Yes
PV % Range	No	No	No	No	No
Loop Current	No	No	No	No	No

Simulation Setting value	Output value			
	PV= Instaneous flow rate		PV= Process temperature	
	PV % Range	Loop Current	PV % Range	Loop Current
Flow rate	Yes	Yes	<Case B-1, 2, 3> No	<Case B-1, 2, 3> No
			<Case B-4> Not available	<Case B-4> Not available
Total flow rate	No	No	<Case B-1, 2, 3> No	<Case B-1, 2, 3> No
			<Case B-4> Not available	<Case B-4> Not available
Process temperature	<Case B-1, 4> No	<Case B-1, 4> No	<Case B-1, 2, 3> Yes	<Case B-1, 2, 3> Yes
	<Case B-2, 3> Yes	<Case B-2, 3> Yes	<Case B-4> Not available	<Case B-4> Not available
Process density	<Case B-1, 3, 4> No	<Case B-1, 3, 4> No	<Case B-1, 2, 3> No	<Case B-1, 2, 3> No
	<Case B-2> Yes	<Case B-2> Yes	<Case B-4> Not available	<Case B-4> Not available
PV % Range	Yes	Yes	<Case B-1, 2, 3> Yes	<Case B-1, 2, 3> Yes
			<Case B-4> Not available	<Case B-4> Not available
Loop Current	No	Yes	<Case B-1, 2, 3> No	<Case B-1, 2, 3> Yes
			<Case B-4> Not available	<Case B-4> Not available

(3) Squawk (Effective only when setting to HART 7)

This feature can be used to identify the communicating device by remotely causing LCD to display the particular pattern as shown in the Figure 9.4
"SQUAWK" continues for approximately 10 seconds, then is released automatically.

- Procedure to call up the **Squawk** display

[Root Menu] → Diag/Service → Squawk(Method)

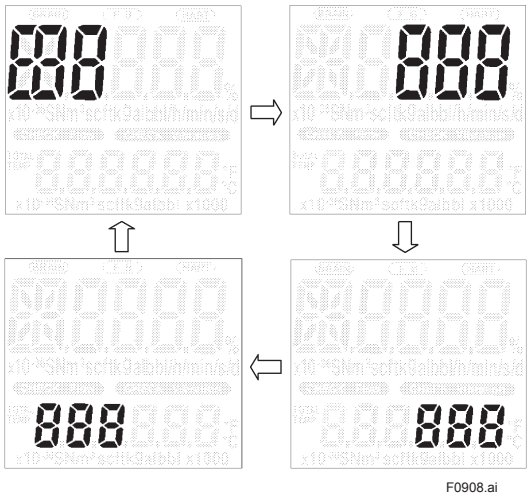


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Figure 9.4 Display for Squawk

9.10.6 Switching HART Protocol Revision

When the output signal code is "-J", HART protocol revision of the device can be selectable from 5 or 7. The HART protocol revision is set and shipped as specified in the order.
To change the HART protocol revision after shipment, follow the procedure shown below.

IMPORTANT

When change the protocol revision, confirm the items below.

- Protocol revision supported by HART configuration tool must be the same or higher than new protocol revision of the device. (Refer to Section 9.1 "HART Protocol Revision")
- Confirm that the DD or DTM which is suitable to new protocol revision of the device is installed in the configuration tool. (Refer to Section 9.2 "HART Configuration Tool and Matching of Device Revision" and Section 9.3 "Setting Parameters using DTM")

(1) Call up the parameter for protocol revision change

- Procedure to call up the **Chng universal rev** display.

DD (HART 5/7) DTM (HART 7)	**[Root Menu]** → Detailed setup → Device information → Revision numbers → Chng universal rev
DTM (HART 5)	**[Root Menu]** → Configuration → HART → Chng universal rev

(2) Activate the "Chng universal rev" method

IMPORTANT

The message is displayed to separate the device from the automatic control loop.
Confirm that the device is separated.

(3) Input the new revision number

An input column for new protocol revision number is displayed. Input the new HART protocol revision number of "5" for HART 5 or "7" for HART 7.
It checks that the revision number which it is going to change into the Next universal rev column is displayed.
[Root Menu] → Detailed setup → Device information → Revision numbers → Next universal rev

(4) Applying the new protocol revision

a. Close the configuration tool
After completion of Chng universal rev method, close the HART configuration tool.

NOTE

When using a FieldMate, close the main display of FieldMate.

b. Restart the device
Turn off the power to the device, and turn it on.

IMPORTANT

New protocol revision is applied only after having performed restart of the device.

NOTE

A new HART revision number is displayed on the integral indicator for three seconds after restart the device. (Refer to Section 9.2 “HART Configuration Tool and Matching of Device Revision”)

(5) Confirming the new protocol revision

a. Restart the HART configuration tool

NOTE

When execute the other parameter confirmation or setting change, execute after restart the configuration tool.

b. Confirm the new HART protocol revision number

Call up the **Universal rev** parameter, and confirm that the new HART revision number is displayed.

- Procedure to call up the **Universal rev**. parameter.

DD (HART 5/7) DTM (HART 7)	**[Root Menu]** → Detailed setup → Device information → Revision numbers → Universal rev →
DTM (HART 5)	**[Root Menu]** → Configuration → HART → Universal rev. →
5	HART protocol revision: 5
7	HART protocol revision: 7

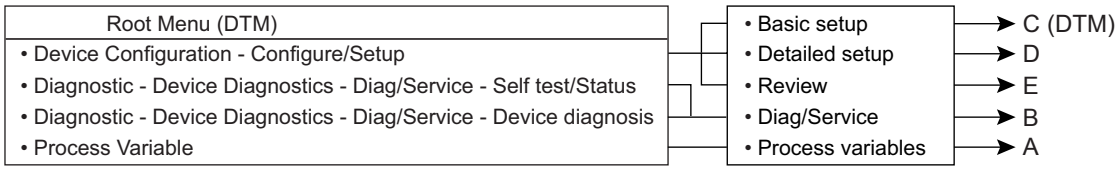
9.10.7 Other Operations for the HART Configuration Tool

Regarding other operations for the HART Configuration Tool, refer to the HART Configuration Tool operations manual.

9.11 Menu Tree (HART 7)

• DD (HART 7) Menu Tree

• DTM (HART 7) Menu Tree



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(R) Read only
(CR) Continuous read
(RW) Read and Write
(M) Method of HCF
Unique Method of DY
(MV) Only for Multi-Variable Type

[ ] Parameter No. in display and BRAIN Terminal.
* Upload/Download

A

Process variables

Flow rate	[A20]	(CR)
Total	[A30]	(CR)
Temp	[A41]	(CR)
%rnge	[A10]	(CR)
Loop Current		(CR)
Device variable status		

Flow rate Data Quality	(CR) Data quality enum
Flow rate Limit Status	(CR) Limit status enum
Total Data Quality	(CR) Data quality enum
Total Limit Status	(CR) Limit status enum
Temp Data Quality	(CR) Data quality enum
Temp Limit Status	(CR) Limit status enum
%rnge Data Quality	(CR) Data quality enum
%rnge Limit Status	(CR) Limit status enum
Loop Current Data Quality	(CR) Data quality enum
Loop Current Limit Status	(CR) Limit status enum

Time Stamp (CR)

Data quality enum
Bad
Poor accuracy
Manual / Fixed
Good

Limit status enum
Not limited
Low limited
High limited
Constant

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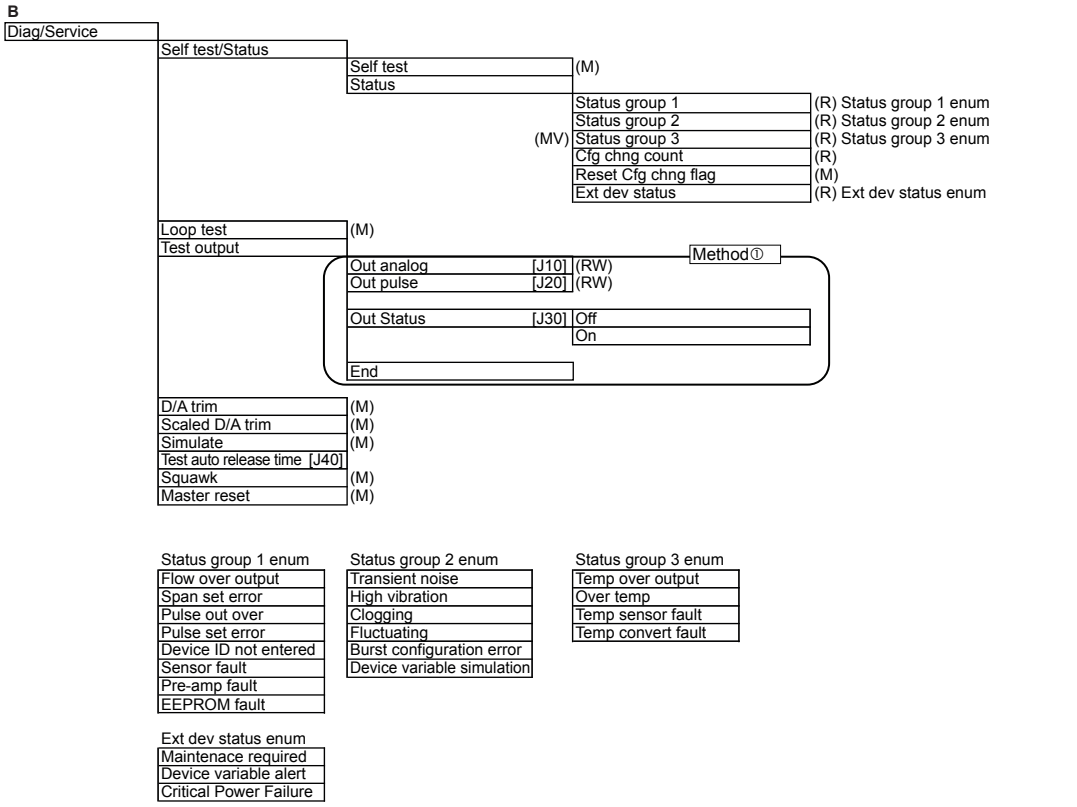
(R) Read only
(CR) Continuous read
(RW) Read and Write
(M) Method of HCF
Unique Method of DY
(MV) Only for Multi-Variable Type

[ ] Parameter No. in display and BRAIN Terminal.
* Upload/Download



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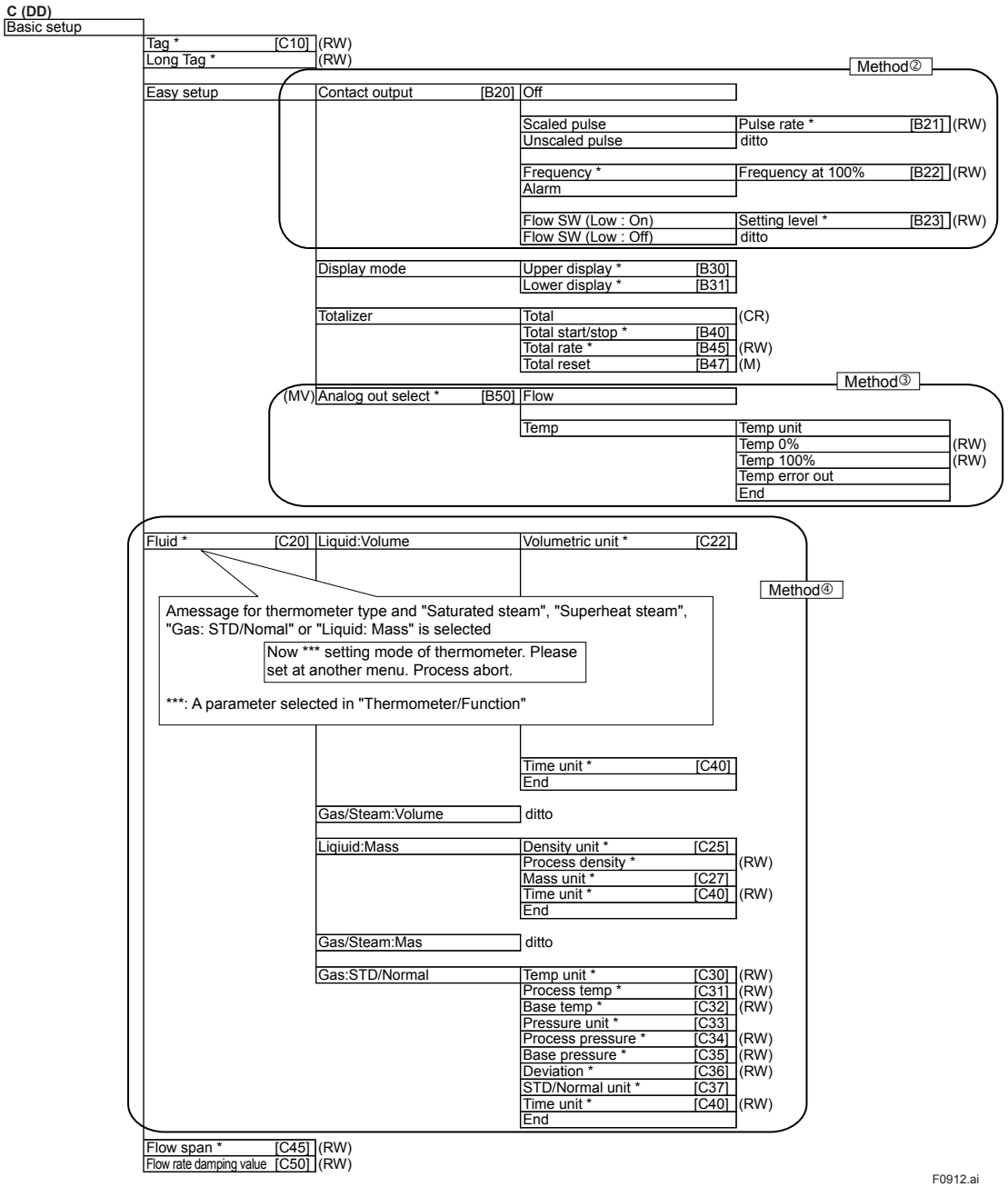
(R) Read only
(CR) Continuous read
(RW) Read and Write
(M) Method of HCF
Unique Method of DY
(MV) Only for Multi-Variable Type

[ ] Parameter No. in display and BRAIN Terminal.
* Upload/Download



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(R) Read only
(CR) Continuous read
(RW) Read and Write
(M) Method of HCF
Unique Method of DY
(MV) Only for Multi-Variable Type

[ ] Parameter No. in display and BRAIN Terminal.

C (DTM)

- Basic setup
  - Tags
    - Tag (RW)
    - Long tag (RW)
  - Easy setup
    - Contact output (M) Method②
    - Display mode
      - Upper display [B30] (RW)
      - Lower display [B31] (RW)
    - Totalizer
      - Total [A30] (R)
      - Total start/stop [B40] (RW)
      - Total rate [B45] (RW)
      - Total reset (M)
    - Analog out select (M) Method③
    - Flow span [B10] (RW)
    - Flow rate damping value [B15] (RW)
  - Device information
    - Date (RW)
    - Descriptor (RW)
    - Massage (RW)
    - Write protect (R)
    - Model (R)
  - Others
    - Fluid (M) Method④

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(R) Read only
(CR) Continuous read
(RW) Read and Write
(M) Method of HCF
Unique Method of DY
(MV) Only for Multi-Variable Type

[ ] Parameter No. in display and BRAIN Terminal.
* Upload/Download

D

- Detailed setup
  - Characterize meter
    - Nominal size * [E10] (RW)
    - Body type * [E20] (RW)
    - Sensor type * [E30] (RW)
    - K-factor setup
      - K-factor unit * [E40] (RW)
      - K-factor * [E41] (RW)
    - Detector No. * [E50] (RW)
  - Flow rate units
    - Fluid * [C20] (M): Method④
    - Method⑤
      - Special unit [D40] No
      - Yes
        - Base unit * (R)
        - User's unit * (RW)
        - Conversion factor * (RW)
        - End
      - Special
        - Base unit * (R)
        - User's unit * (RW)
        - Conversion factor * (RW)
        - End
  - Configure outputs
    - Analog outputs
      - Flow span * [B10] (RW)
      - Out limit(H) * [D30] (RW)
      - Burn out [D35] (R)
      - Loop current mode (RW) Loop current mode enum
      - Channel flags (R)
    - Contact output * (M)
    - Display mode
      - Upper display [B30] (RW)
      - Lower display [B31] (RW)
    - Totalizer
      - Total [A30] (CR)
      - Total start/stop [B40] (RW)
      - Total rate [B45] (RW)
      - Total reset [B47] (M)
    - HART output
      - Poll addr (RW)
      - Loop current mode (RW) Loop current mode enum
      - Num req preams (R)
      - Num resp preams (RW)
      - Burst condition
      - Burst message 1
        - Burst mode (RW) Burst mode enum
        - Burst command (RW) Burst command enum
        - Burst device variables (RW) Burst device variables enum
        - Set Burst Trigger (M)
        - Set Burst Period (M)
        - Burst trigger mode (R)
        - Burst trigger level (R)
        - Update period (R) Update period enum
        - Max update period (R) Update period enum
      - Burst message 2 ditto
      - Burst message 3 ditto

To be continued to next page (**D1**)

Loop current mode enum
- Disabled
- Enabled

Burst mode enum
- Off
- Wired HART Enabled

Burst command enum
- Cmd 1 : PV
- Cmd 2 : % range/current
- Cmd 3 : Dyn vars/current
- Cmd 9 : Device vars w/ status
- Cmd 33: Device variables
- Cmd 48 : Read Additional Device Status

Burst device variables enum
- Burst variable code
- Burst variable code
- Burst variable code
- Burst variable code
- Burst variable code
- Burst variable code
- Burst variable code
- Burst variable code

Update period enum
- 0.5 s
- 1 s
- 2 s
- 4 s
- 8 s
- 16 s
- 32 s
- 1 min
- 5 min
- 10 min
- 15 min
- 30 min
- 45 min
- 60 min

F0914.ai

(R) Read only
(CR) Continuous read
(RW) Read and Write
(M) Method of HCF
Unique Method of DY
(MV) Only for Multi-Variable Type

[ ] Parameter No. in display and BRAIN Terminal.
* Upload/Download

D1

- Event notification
  - Event notification control
  - Event mask
    - Device Status Mask
    - Status group 1 (RW) Status group 1 enum
    - Status group 2 (RW) Status group 2 enum
    - Status group 3 (RW) Status group 3 enum
    - Ext dev status Mask (RW) Ext dev status enum
    - Device Diagnostic Status 0 Mask (RW) Device Diagnostic Status 0 Mask
  - Set event notification timing (M)
  - Event notification retry time (R) Update period enum
  - Max update time (R) Update period enum
  - Event debounce interval (R)
  - Knowledge
    - Acknowledge event notification (M)
    - Event Status (R)
    - Event Number (R)
    - Time first unack event triggered (R)
    - Latched Cfg chng count (R)
    - Latched Device Status (R)
    - Status group 1 (R) Status group 1 enum
    - Status group 2 (R) Status group 2 enum
    - (MV) Status group 3 (R) Status group 3 enum
    - Latched Ext dev status (R) Ext dev status enum
    - Latched Device Diagnostic Status S (R) Device Diagnostic Status 0 Mask
- Flow rate Update time period (R)
- Total Update time period (R)
- Temperature Update time period (R)
- Density Update time period (R)
- Dynamic variable assignment
  - PV is (R) PV assign enum
  - SV is (R) Dyn var assign enum
  - TV is (R) Dyn var assign enum
  - QV is (R) Dyn var assign enum
  - (MV) Chng dyn var assign (M) Dyn var assign enum

To be continued to next page (**D2**)

Device Diagnostic Status 0 Mask

Simulation active
Non-Volatile memory failure
Volatile memory error
Watchdog reset executed
Voltage conditions out of range
Environmental conditions out of range
Electronic failure

PV assign enum

Flow rate
Temperature

Dyn var assign enum

Flow rate
Total
Temperature
Density

F0915.ai

(R) Read only
(CR) Continuous read
(RW) Read and Write
(M) Method of HCF
Unique Method of DY
(MV) Only for Multi-Variable Type

[ ] Parameter No. in display and BRAIN Terminal.
* Upload/Download

D2

- Signal processing
  - Flow rate damping value [B15] (RW)
  - Low cut * [D10] (RW)
  - Temp setup
    - Temp unit [D20] (RW)
    - Process temp [D21] (RW)
  - Density setup
    - Density unit [D25] (RW)
    - Process density [D26] (RW)
  - Maintenance
    - TLA * [K10] (RW)
    - Signal level * [K20] (RW)
    - Method⑥
      - Noise balance mode * [K25]
        - Auto (RW)
        - Manual
          - Set noise ratio (RW)
          - End
        - Tuning at zero flow
    - Noise ratio * [K26] (CR)
    - Maintenance data
      - Velocity [K30] (CR)
      - Span velocity [K32] (CR)
      - Vortex frequency [K34] (CR)
      - Span frequency [K36] (CR)
      - (MV) Density [K38] (CR)
    - Error record [K40]
      - Err record reset (M)
      - Er record status 1 (CR) Er record status 1 enum
      - Er record status 2 (CR) Er record status 2 enum
      - (MV) Er record status 3 (CR) Status group 3 enum
    - High vibration * [K45] (RW)
    - Method⑦
      - Amplifier check
        - Set vortex frequency [K28] (RW)
        - End
    - Menu type number (RW)
    - Menu type (R)
  - Adjust
    - User adjust * [H20] (RW)
    - Method⑧
      - Reynolds adjust * [H25]
        - Not active
        - Active
          - Process density (RW)
          - Viscosity * (RW)
          - End
    - Gas expansion fact * [H30]
      - Not active (RW)
      - Active (RW)
    - Method⑨
      - Flow adjust * [H40]
        - Not active
        - Active
          - Set point 1-data * (RW)
          - Set point 2-data * (RW)
          - Set point 3-data * (RW)
          - Set point 4-data * (RW)
          - Set point 5-data * (RW)
          - End

To be continued to next page (**D3**)

Er record status 1 enum

- Flow over output
- Span set error
- Pulse out over
- Pulse set error
- Sensor fault
- Pre-amp fault
- EEPROM fault

Er record status 2 enum

- Transient noise
- High vibraton
- Clogging
- Fluctuating

F0916.ai

(R) Read only
(CR) Continuous read
(RW) Read and Write
(M) Method of HCF
Unique Method of DY
(MV) Only for Multi-Variable Type

[ ] Parameter No. in display and BRAIN Terminal.
* Upload/Download

D3

- Device information
  - Manufacturer (R)
  - Tag * (RW)
  - Long tag * (RW)
  - Descriptor * (RW)
  - Message * (RW)
  - Date * (RW)
  - Write protect (R)
  - Revision numbers
    - Universal rev (R)
    - Fld dev rev (R)
    - Software rev (R)
    - Hardware rev (R)
    - Final asmbly num (R)
    - Dev id (R)
    - Next universal rev (R)
    - Chng universal rev (M)
  - Max dev vars (R)
  - Device profile (R) Device profile enum
  - Flow rate Update time period (R)
  - Country (RW) Country enum
- (MV) Thermometer
  - Function — Method⑩
    - Monitor only
    - Saturated steam
      - Mass unit [F12] (RW)
      - Time unit [F35] (RW)
      - End
    - Superheat steam
      - Pressure unit [F14] (RW) Pressure unit enum
      - Process pressure [F15] (RW)
      - Mass unit [F16] (RW)
      - Time unit [F35] (RW)
      - End
    - Gas:STD/Normal
      - Temp unit [F18] (RW)
      - Base temp [F19] (RW)
      - Pressure unit [F20] (RW) Pressure unit enum
      - Process pressure [F21] (RW)
      - Base pressure [F22] (RW)
      - Deviation [F23] (RW)
      - STD/Normal unit [F24] (RW)
      - Time unit [F35] (RW)
      - End
    - Liquid:Mass
      - Density unit [F26] (RW)
      - Base density * [F27] (RW)
      - Temp unit [F28] (RW)
      - Base temp [F29] (RW)
      - 1'st temp coeff * [F30] (RW)
      - 2'nd temp coeff * [F31] (RW)
      - Mass unit [F32] (RW)
      - Time unit [F35] (RW)
      - End
    - Not use
  - Cable length * [F52] (RW)
  - Temp damping * [F50] (RW)
  - Analog out select * [F55] (M): Method③

E

- Review
  - Review 1
  - Review 2
  - Review 3
- (MV) Review 4

Device profile enum

Process automation device
Discrete device

Country enum

0x5553 "US"
0x4a50 "JP"
0x4445 "DE"
0x4652 "FR"
0x4553 "ES"
0x5255 "RU"
0x434e "CN"

Pressure unit enum

MPa abs
kPa abs
kg/Sqcm abs
bar abs
psia

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Review 1	Review 2	Review 3	Review 4
Model	Flow rate unit	Special unit	Function
Manufacturer	Flow span	User's unit	Base density
Distributor	Flow rate damping value	Conversion factor	1'st temp coeff
Cfg chng count	Contact output	Nominal size	2'nd temp coeff
Max dev vars	Pulse rate	Body type	Cable length
Tag	Frequency at 100%	Sensor type	Temp damping
Long tag	Setting level	K-factor	Analog out select
Descriptor	Upper display	Detector No	Temp 0%
Message	Lower display	User adjust	Temp 100%
Date	Total rate	Reynolds adjust	Temp error out
Dev id	Total start/stop	Viscosity	(Only for /MV)
Write protect	Fluid	Gas expansion fact	
AO Alrm typ	Process density	Flow adjust	
Universal rev	Process temp	TLA	
Fld dev rev	Base temp	Signal level	
Software rev	Process pressure	Noise balance mode	
Hardware rev	Base pressure	Noise ratio	
Poll addr	Deviation	High vib.	
Loop current mode	Low cut	Span velocity	
Num req preams	Out limit (H)	Span frequency	
Num resp preams	Burn out		

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10. OPERATION

After you have installed the flowmeter into the process piping, wired the input/output terminals, set up the required parameters, the vortex flowmeter should output an accurate flow signal from its terminals as soon as the measured liquid begins to flow.
This section describes procedure of test method and adjustment method for the pre-operation.

NOTE

The initial parameter setting has already been done at the factory according to the sizing data when ordering. Therefore it is not necessary to set parameters except measurement condition changes or some additions happen.

10.1 Adjustment

10.1.1 Zero Adjustment

No zero adjustment is necessary since the zero point does not shift.
Because of the effect of electrical noise and vibration noise, digitalYEWFLO may provide an output even when the flowrate is zero. In that case, properly eliminate the source of the noise.
Refer to Section 10.2 “Adjustment for Manual Mode.”

10.1.2 Span Adjustment

In normal application, you need not confirm the span.
If you need to ensure the output of 4 to 20mA DC, refer to Subsection 10.1.3 “Loop Test.”

10.1.3 Loop Test

To ensure output of 4 to 20mA DC or pulse, their loop tests can be done using parameter “J10 (Analog out)” or “J20 (Pulse test)”.
If you are verifying the analog output, follow the procedure on the verification procedure.
<Check Procedure>

1. Connect the instruments referring to Figure 10.1, and warm up for three minutes more.
2. Set span frequency in Parameter J10:OUT ANALOG.
3. In case the load resistance is 250Ω, digital multimeter indicates 5V. Otherwise if it is known load resistance value, it indicates R (Ω) × 0.02 (A).
4. Check output value is in the rated value (±0.016 mA) after set 50% in Parameter J10.
5. Check output value is in the rated value (±0.016 mA) after set 0% in Parameter J10.

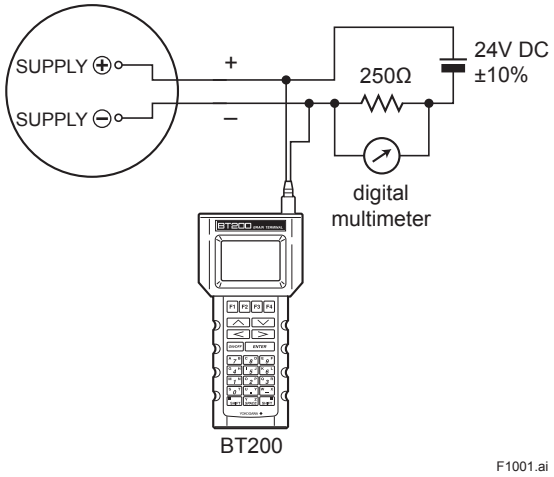


Figure 10.1 Connection of Maintenance Instruments

IMPORTANT

- When using any test-purpose measuring instruments, do not ground them.
- All of your parameter settings will be cancelled if you turn digitalYEWFLO off less than 30 seconds after the parameter setup. Keep digitalYEWFLO turned on at least 30 seconds after setting up the parameters.

NOTE

When configure the parameters using the HART Configuration Tool, refer to Section 8.11 “Menu Tree (HART 5)” or Section 9.11 “Menu Tree (HART 7).”

10.1.4 Totalizer Start and Totalizer Reset

When using the Totalizer Function, the start setup should be done.

(1) Start operation using BT200
Enter to B40(TOTAL START), and move the video bar to “EXECUTE”. Push “ENTER” key at 2 times.

(2) Start operation using indicator
Enter to “Setting mode”, move to B40 of parameter number, and enter to “01” of data number.
Refer to Section 5.4 “Setting Mode.”

Totalized value can be reset using the indicator or BT200.

(1) Reset operation using BT200
Enter to B42 (TOTAL RESET), and move the video bar to “EXECUTE”. Push “ENTER” key at 2 times.

(2) Reset operation using indicator
Enter to “Setting mode”, move to B42 of parameter number, and enter to “01” of data Number.
Refer to Section 5.4 “Setting Mode.”

10.1.5 Setting of Pulse Output (Scaling)

Pulse output are constructed by two units, that are “Scaled pulse and Unscaled Pulse”.

(1) Scaled Pulse

When SCALED PULSE is selected in B20, set flowrate per one pulse output. Rate unit is linking to the flow unit.

(2) Unscaled Pulse

When UNSCALED PULSE is selected in B20, it outputs the pulse calculated by following formula. The formula for output pulse number is as follows.
Output pulse number per one second = vortex number per one second / PULSE RATE set number.
Refer to Section 11.6 “Flow Calculation.”

● Pulse Rate setting

Pulse rate setting is settable by “B21:PULSE RATE”.

10.1.6 Setting of Burnout Switch

digitalYEWFLO is equipped with a CPU error burnout function used to set the output direction upon CPU error, and a sensor burnout function that sets the direction of the output in the event of burnout of the temperature sensor. When factory-shipment under normal conditions, the output of both CPU error burnout and sensor burnout are set to HIGH, but if option code /C1 is specified, the CPU error burnout is set to LOW(-2.5% below) output, and sensor burnout is set to LOW(-2.5% below) output, respectively. The setting of the direction of output from burnout can be changed. To change the direction of output arising from burnout, switch the setting pin on the CPU assembly (Refer to Table 10.1).

Table 10.1 Output Setting Pin for Burnout

Pin position	CPU error burnout direction	CPU error burnout output	Remark
H L	HIGH	110% or more (21.6mA DC)	Set to HIGH before shipment.
H L	LOW	-2.5% or less (3.6mA DC)	Set to LOW for option code /C1.

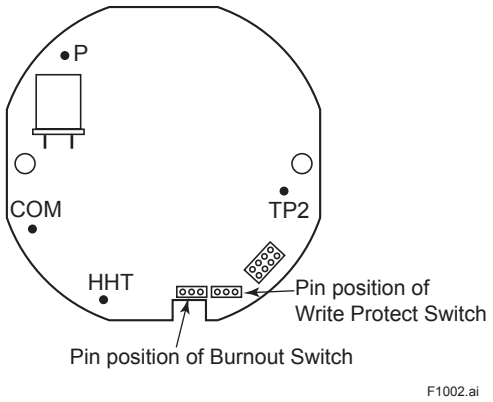


Figure 10.2 Pin position of Burnout and Write Protect Switch

10.1.7 Setting of Write Protect Switch

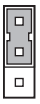
By setting the write protect function to “Protect”, it is possible to prevent the overwriting of parameters. Write protection can be carried out using either the hardware switch on the CPU board (i.e., Switch 2) or software parameter settings. If either of these items is set to “Protect”, the overwriting of parameters will be prohibited.

NOTE

If the hardware switch is set to “Protect”, it will not be possible to overwrite parameters; furthermore, this condition will be maintained until the switch is set to “Enable”.

For more details regarding usage of the write protect function and the software’s parameter switches, refer to Section 8.9 “Software Write Protect” or Section 9.9 “Software Write Protect.”

Table 10.2 Setting pin for Write Protect

Pin position	CPU error burnout direction
	Enable
	Protect

10.1.8 Power Failure

When a power failure occurs, the totalized value will be protected by EEPROM (Electrically Erasable Programmable ROM). But during a power failure, the vortex flowmeter stops and also the totalizing will stop.
After a power is recovered, the vortex flowmeter and the totalizing start to work automatically.
EEPROM doesn’t need a battery for backup.

10.2 Adjustment for Manual Mode

digitalYEWFLO does not need the initial adjustment because digitalYEWFLO is always adjusted by itself automatically.
These adjustments should be done in case that indicator reads over zero at zero flow.

10.2.1 Low Cut Adjustment

Adjust to noise elimination or zero flow in the low flowrate (or low frequency) range.
The settable range for low cut flowrate is to half of minimum flowrate.

10.2.2 Zero Tuning

This adjustment should be done according to a flow figure shown below.

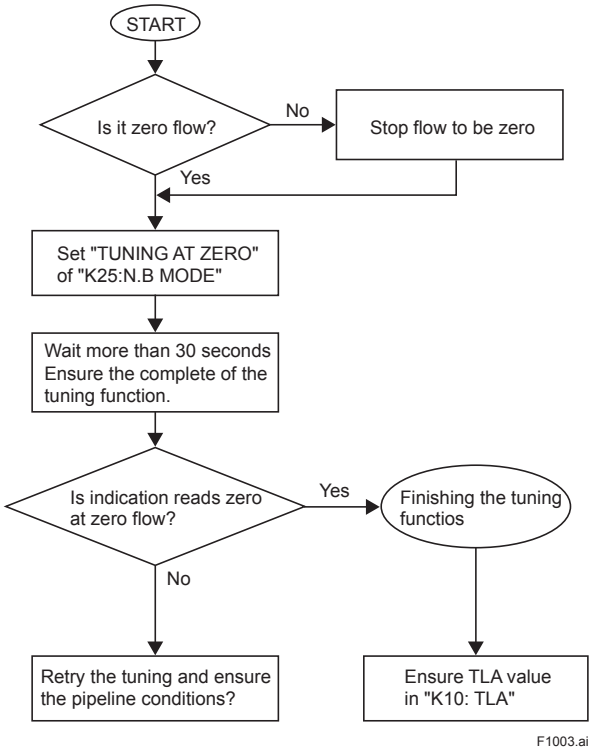

START
Is it zero flow?
No
Stop flow to be zero
Yes
Set "TUNING AT ZERO" of "K25:N.B MODE"
Wait more than 30 seconds Ensure the complete of the tuning function.
Is indication reads zero at zero flow?
Yes
Finishing the tuning functios
No
Retry the tuning and ensure the pipeline conditions?
Ensure TLA value in "K10: TLA"
F1003.ai

Figure 10.3 Tuning Flow

If this adjustment is executed, the following value is changed.

K25:N.B MODE = MANUAL
K26:NOISE RATIO=Constant value

Minimum flowrate is increased when TLA value is changed form initial value.

1. Tuning method

(1) Ensure the condition of flowrate
The necessary condition for tuning function is zero flow.

(2) Executing the tuning function.
Set " TUNING AT ZERO" of "K25:N.B MODE".
Wait more 30 second.

(3) Finishing the tuning functions

Using the BT200

(a) Press "DATA" key of BT200 function key.
(b) Ensure the indication of "MANUAL" which is "K25:N.B MODE"
("NOW TUNING" is indicated during tuning operation.)

Using the indicator

(a) Press "SHIFT" and "SET" key simultaneously.
(b) Press "SET" key and ensure "01" of Lower indication.
("02" is indicated during tuning operation. Execute (a), (b) once again.)

2. TLA value

TLA values is possible to change after executing "TUNING". In this case, minimum flowrate is increased.
Minimum flowrate for TLA value is given by below equation.

$$\text{Minimum Flowrate after changing TLA Value} = \text{Specified Minimum Flowrate} \times \sqrt{\frac{\text{TLA Value after Tuning}}{\text{TLA initial value or defalt value}}}$$

F1004.ai

Ensure minimum flowrate for changing TLA value.

3. Output

After tuning, ensure that the indication reads is zero where no fluid is flowing.
If the indication reads over zero is done continuously, retry the tuning and ensure the below condition.

Does high vibrations occur in pipeline?

In this case, refer to Section 3.1 "Installation Precautions", and keep the pipeline properly.

11. MAINTENANCE

CAUTION

- Disassemble work should be done only for error occurrence.
- Maintenance work must be carried out by expert engineer or skilled personnel and not by operators.
- Before opening the cover, it is important to ensure that at least 10 minutes have passed since the power was turned off. Furthermore, opening of the cover must also be carried out by expert engineer or skilled personnel.

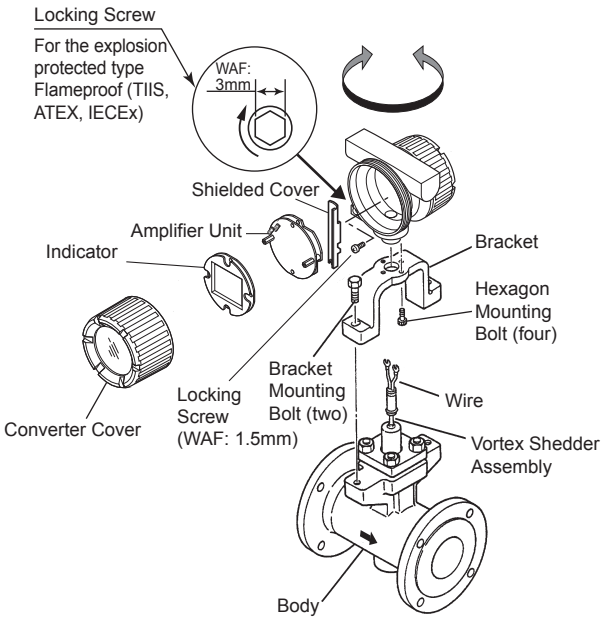
CAUTION

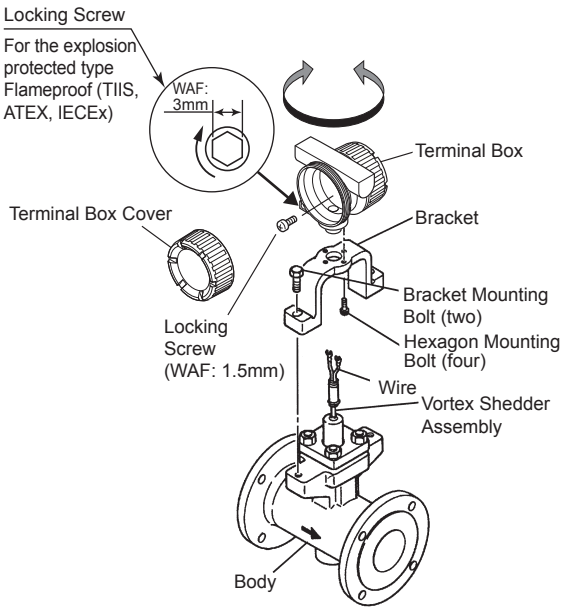
- It is prohibited by law for the user to modify flameproof instruments. It is not permitted to add or remove indicators. If modification is required, contact YOKOGAWA.
- Explosion protected type must be, as a rule, removed to a non-hazardous area for maintenance and be disassembled and reassembled to the original state.
- For TIIS and ATEX explosion proof, the display cover is locked by the Locking Screw. In case of opening the display cover, use the hexagonal wrench attached.
- Be sure to lock the cover by the Locking Screw using the hexagonal wrench attached after installing the cover.

11.1 Changing the Converter and the Terminal Box Orientation

The converter and the terminal box can be changed in four directions with respect to the flow direction.

Integral Type Vortex Flowmeter	Remote Type Vortex Detector
<1> Remove the converter cover. In case of the explosion proof type cover removal, loosen the Locking Screw (WAF: 3mm). <2> For indicator and amplifier unit removal, refer to Section 11.2 “Indicator Removal and Rotation” and Section 11.3 “Amplifier Unit Removal”. <3> Disconnect the vortex shedder assembly lead-wires from the converter. In case of the explosion proof type, loosen the Locking Screw (WAF: 1.5mm). <4> Remove the bracket mounting bolts and remove the converter and bracket from the flowmeter body. The bracket applies to the 1 (25mm) to 4 (100mm) inch flowmeters. <5> Remove the hexagon mounting bolts in case of 90-degree turn. <6> Turn the converter to the desired orientation. When reassembling the converter, reverse the above procedure. <7> After changing the direction, make sure the impedance between the earth terminal and the metal part of body, vortex shedder assembly or bracket is 100Ω or less.	<1> Remove the terminal box cover. In case of the explosion proof type cover removal, loosen the Locking Screw (WAF: 3mm). <2> Disconnect the vortex shedder assembly lead-wires from the terminal box. In case of the explosion proof type, loosen the Locking Screw (WAF: 1.5mm). <3> Remove the bracket mounting bolts and remove the terminal box and bracket from the flowmeter body. The bracket applies to the 1 (25mm) to 4 (100mm) inch flowmeters. <4> Remove the hexagon mounting bolts in case of 90-degree turn. <5> Turn the terminal box to the desired orientation. When reassembling the terminal box, reverse the above procedure. <6> After changing the direction, make sure the impedance between the earth terminal and the metal part of body, vortex shedder assembly or bracket is 100Ω or less.





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11.2 Indicator Removal and Rotation

IMPORTANT

For Explosion protected type, modification by the user is prohibited. It is prohibited to add or remove the indicator.

CAUTION

- For flameproof type, move vortex flowmeter to non-hazardous area firstly, then remove and rotate the indicator. The instrument must be restored to its original condition.
- For flameproof type, when you open the cover, turn the locking screw to the right and unlock. When you close the cover, be sure to turn the locking screw to the left and lock.
- For TIIS flameproof type, refer to "INSTALLATION AND OPERATING PRECAUTIONS FOR TIIS FLAMEPROOF EQUIPMENT" at the end of this User's manual.

(1) Turn the power off.
(2) Remove the cover.
In case of the Explosion protected type, remove the cover after unlock the Locking Screw.
(3) For the indicator, disconnect the cable connector from the amplifier unit.
(4) Loosen the two indicator mounting screws using a Phillips screwdriver.
(5) Pull out the indicator.
(6) Reinstall the indicator in the reverse order to its removal (above) and secure the mounting screws.

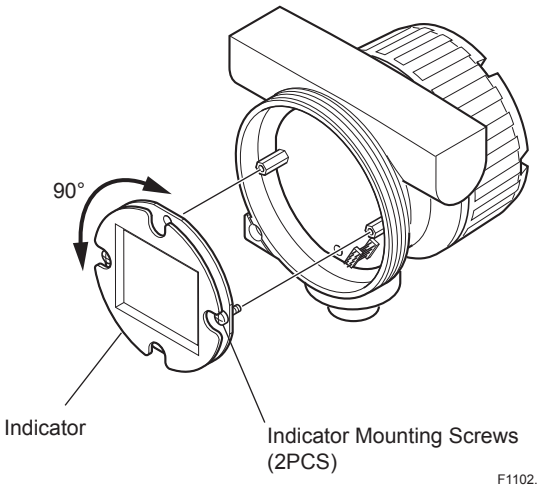


Figure 11.1 Removing and Reinstalling the Indicator

11.3 Amplifier Unit Removal

IMPORTANT

Do not turn the amplifier unit for removal or assembling. The connector pins may be damaged.

(1) Turn the power OFF.
(2) Remove the converter cover.
In case of the Explosion protected type, remove the cover after unlock the Locking Screw.
(3) Remove the indicator according to the procedures described in Section 11.2 "Indicator Removal and Rotation."
(4) Loosen the terminal screws and remove the amplifier unit.

11.4 Amplifier Unit Assembling

IMPORTANT

The amplifier unit must be assembled keeping the procedure as follows. Amplifier may not operate normally when the procedure does not keep.

(1) Put two Mounting Pins ① into Mounting Holes ②.
(2) Push the head of two Mounting Screws ④ lightly.
(3) Push head of two IC ⑤ and mount the Amplifier Unit ③.
(4) Tighten two Mounting Screws ④.

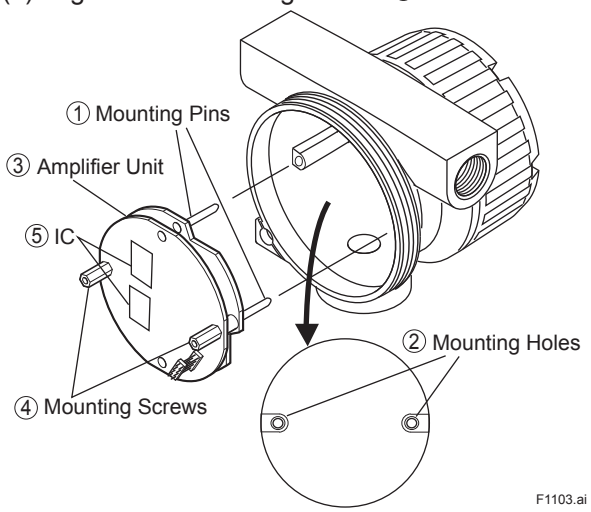


Figure 11.2 Removing and Reinstalling the Amplifier Unit

11.5 Vortex Shedder Removal

CAUTION

- Disassemble work should be done only for error occurrence.
- Only expert engineer or skilled personnel are permitted to open the cover.
- When the vortex shedder is disassembled, and empty the flow tube before the gasket must be replaced with a new one.
- Output error may cause when the shedder bar is not restored correctly.
- For Explosion proof type, move vortex flowmeter to non-hazardous area firstly, then do the assemble work.

(1) For nominal size 15 to 100mm (1/2 to 4 inch), remove the converter cover or terminal box according to the following (2) to (5). For nominal size 150 to 400mm (6 to 16 inch), this procedure is not necessary.

(2) For integral type, remove the converter cover. For remote type, remove the terminal cover. For integral type, loosen the hexagonal screw on the Amplifier unit, then remove the amplifier unit. Remove the indicator first, in case the device has it.

(3) For integral type, remove the Shielded cover back Amplifier unit. In case of following Explosion proof type, loosen the locking screw on the converter case or terminal box.
Explosion proof type: TIIS Flame proof, ATEX Explosion proof, IECEx Flame proof

(4) Remove the Leadwire by loosening a screw on the terminal strip.

(5) Loosen the bracket mounting bolts and remove the converter case or terminal box together with the bracket. Be careful not to damage the leadwires of the vortex shedder assembly.

(6) Loosen the vortex shedder assembly mounting bolts (2 to 10 pcs) and remove the vortex shedder assembly.

(7) When reassembling the vortex shedder assembly, reverse above procedure. Confirm the following.
a. Replace to a new gasket.
b. The guide pin on the vortex shedder mounting block meets the guide pin hole. Refer to Figure 11.3.
Nominal size 150 to 400mm (6 to 16 inch) has no guide pin.
c. The vortex shedder assembly is installed as illustrated in Figure 11.3.
d. Tighten the sensor mounting bolts uniformly and diagonally in three or four times. Refer to Table 11.1 and Figure 11.4.

Table 11.1 Torque Value

Model Code			Torque Value UNIT: N.m		
			Standard, /NC, /LT	/HT	
				A	B
DY015	DY025 /R1	DY040 /R2	16		
DY025	DY040 /R1	DY050 /R2	12	18	12
DY040	DY050 /R1	DY080 /R2	12	18	12
DY050	DY080 /R1	DY100 /R2	18	27	18
DY080	DY100 /R1	DY150 /R2	32	48	32
DY100	DY150 /R1	DY200 /R2	49	74	49
DY150	DY200 /R1	—	69	98	69
DY200	—	—	69	98	69
DY250	—	—	157	210	140
DY300	—	—	157	210	140
DY400	—	—	160	240	160

/HT: High Process Temperature Version
/LT: Cryogenic Version
/NC: NACE Material

e. In case of High Process Temperature Version (Option code: /HT), First time tighten bolts with a torque wrench, applying the torque specified “A”. Next time loosen bolts then again tighten bolts with a torque wrench, applying the torque specified “B”. For loosing process, be sure not to loose bolts completely.
f. Insert the leadwires (vortex shedder) through the terminal box bottom hole and lower the terminal box slowly until the bracket touches the flowmeter shoulder. Be sure to keep the leadwires vertical while lowering the terminal box.
g. After assembling, confirm that there is no leakage from the vortex flowmeter.

IMPORTANT

Please tighten the screws/bolts uniformily and observing the torque value in Table 11.1.

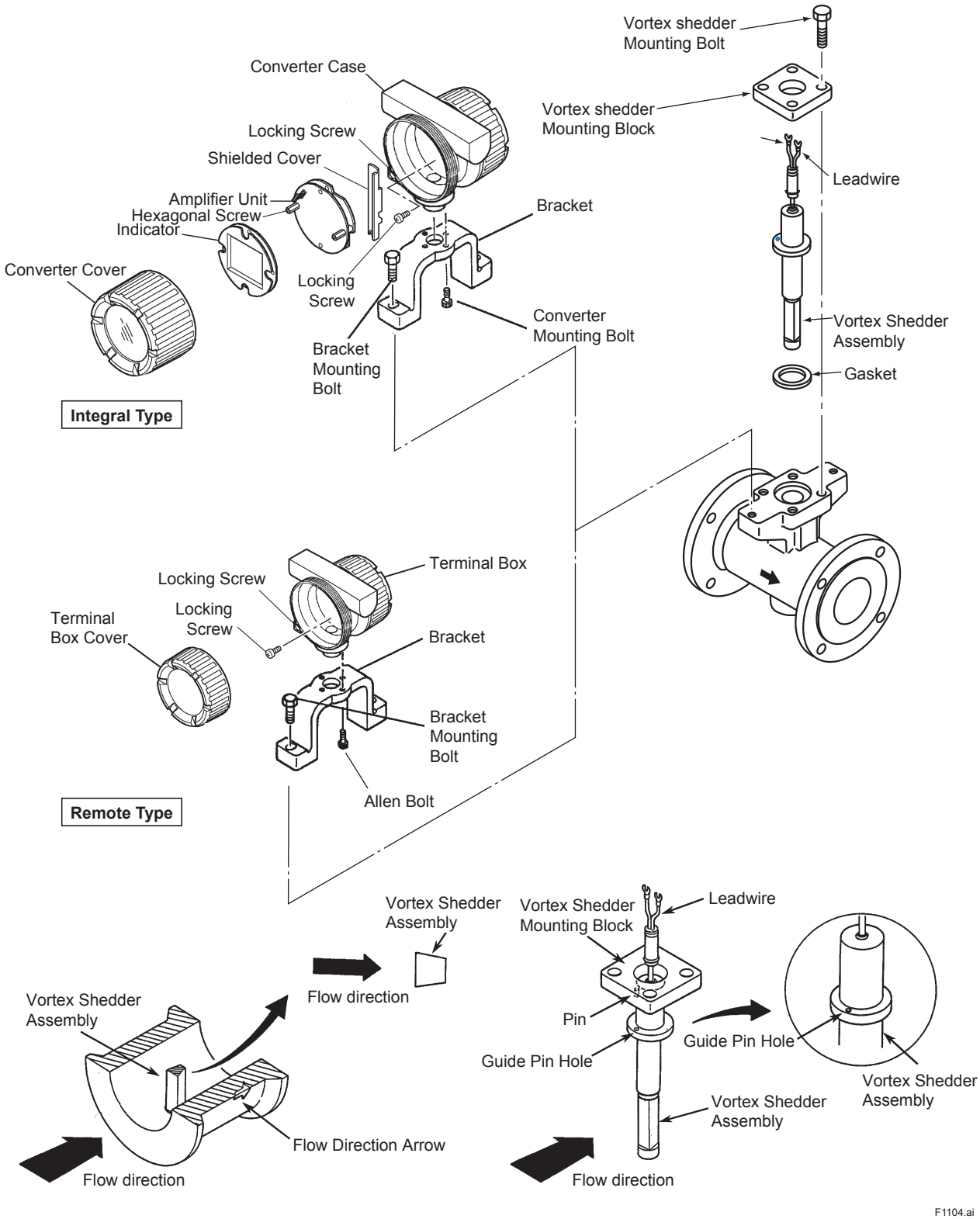


Figure 11.3 Disassembling and Reassembling the Vortex Shedder Assembly

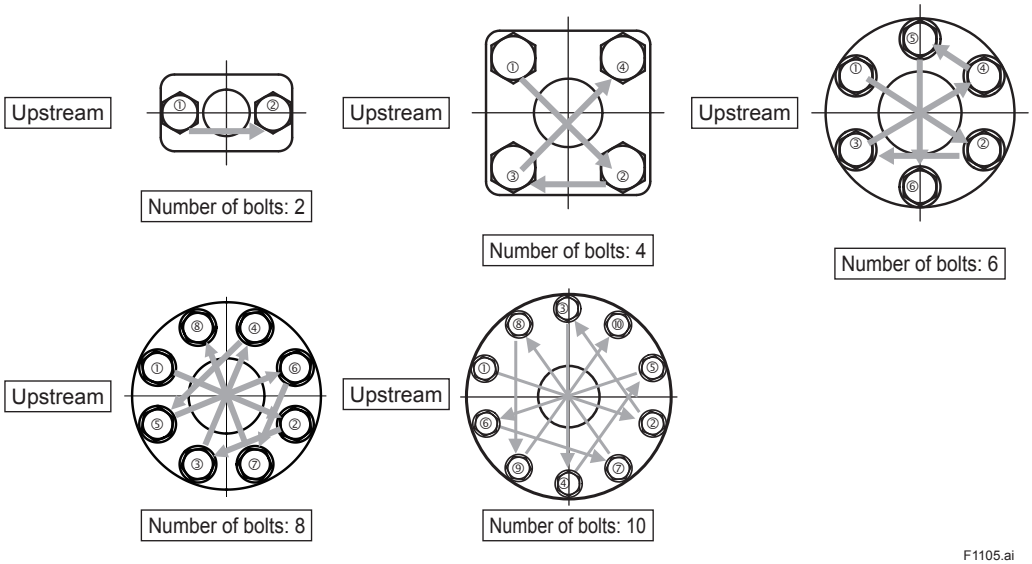


Figure 11.4 Procedure of tightening bolts

11.6 Flow Calculation

(1) Flow Calculation

The flowrate is calculated with the following equations based on the N number of generated vortices:

(a) Flow rate (in engineering units) (RATE)

$$RATE=N \times \frac{1}{\Delta t} \times \varepsilon_f \times \varepsilon_e \times \varepsilon_r \times \frac{1}{KT} \times U_k \times U_{TM} \quad \text{....(11.1)}$$

- Metric Units

$$KT=KM \times U_{KT} \times \{1-4.81 \times (T_f-15) \times 10^{-5}\} \quad \text{.... (11.2.1)}$$

- English Units

$$KT=KM \times \{1-2.627 \times (T_f-59) \times 10^{-5}\} \quad \text{.... (11.2.2)}$$

(b) Flow rate (%) (RATE (%))

$$RATE(\%)=RATE \times \frac{1}{F_S} \times 100 \quad \text{.... (11.3)}$$

(c) Totalized value (TOTAL)

$$TOTAL=TOTAL + \Delta TOTAL \quad \text{.... (11.4)}$$

$$\Delta TOTAL=RATE \times \Delta t \times \frac{1}{T_R} \times \frac{1}{U_{TM}} \quad \text{.... (11.5)}$$

(d) Pulse output frequency (PULSE FREQ)

- Scaled pulse

$$PULSE\ FREQ=RATE \times \frac{1}{P_R} \times \frac{1}{U_{TM}} \quad \text{.... (11.6.1)}$$

- Unscaled pulse

$$PULSE\ FREQ= N \times \frac{1}{\Delta t} \times \frac{1}{P_R} \quad \text{.... (11.6.2)}$$

(e) Velocity (V)

$$V=N \times \frac{1}{\Delta t} \times \frac{1}{KT} \times U_{KT} \times \frac{4}{\pi \times D^2} \quad \text{.... (11.7)}$$

(f) Reynolds number (Re)

- Metric Units

$$Re=V \times D \times \rho_f \times \frac{1}{\mu} \times 1000 \quad \text{.... (11.8.1)}$$

- English Units

$$Re=V \times D \times \rho_f \times \frac{1}{\mu} \times 124 \quad \text{.... (11.8.2)}$$

Where

- N: Number of input pulses (pulse)
- Δt: Time corresponding to N (seconds)
- ε_f: Instrumental error correction factor
- ε_e: Expansion correction factor for compressive fluid
- ε_r: Reynolds number correction factor
- KT: K-factor at operating conditions (pulses/litre) (pulse/gal)
- KM: K-factor at temperature 15°C (59°F)
- U_{KT}: Unit conversion factor for K-factor
- U_k: Flow unit conversion factor (Refer to item (2))
- $U_{k(user)}$: Flow unit conversion factor for user's unit
- U_{TM}: Factor corresponding to flow unit time (ex./m (minute) is 60.)
- P_R: Pulse rate (ex. E+ 3 is 10^3.)
- T_f: Temperature at operating conditions (°C) (°F)
- F_S: Flowrate span
- T_R: Total rate
- D: Internal diameter (m) (inch)
- μ : Viscosity (mPa • s(cP))
- ρ_f: Density at operating conditions (kg/m^3) (lb/ft^3)

(2) Flow Conversion Factor (U_k)

Flow conversion factor U_k is obtained by carrying out the following computation depending on the selection of the fluid to be measured and the flow unit.

(a) Steam

M (Mass flowrate):

$$U_k = \rho_f \times U\rho_f \times U_{k\,(kg)} \quad \text{.... (11.9.1)}$$

$$U_k = \rho_f \times U_{k\,(lb)} \quad \text{.... (11.9.2)}$$

Q_f (Flowrate at operation):

$$U_k = U_{k\,(m^3)} \quad \text{.... (11.10.1)}$$

$$U_k = U_{k\,(acf)} \quad \text{.... (11.10.2)}$$

(b) Gas

Q_n (Flowrate at STP):

$$U_k = \frac{P_f}{P_n} \times \frac{T_n + 273.15}{T_f + 273.15} \times \frac{1}{K} \times U_{k\,(Nm^3)} \quad \text{.... (11.11.1)}$$

$$U_k = \frac{P_f}{P_n} \times \frac{\frac{5}{9}(T_n - 32) + 273.15}{\frac{5}{9}(T_f - 32) + 273.15} \times \frac{1}{K} \times U_{k\,(scf)} \quad \text{.... (11.11.2)}$$

M (Mass flowrate):

$$U_k = \rho_f \times U\rho_f \times U_{k\,(kg)} \quad \text{.... (11.12.1)}$$

$$U_k = \rho_f \times U\rho_f \times U_{k\,(lb)} \quad \text{.... (11.12.2)}$$

Q_f (Flowrate):

$$U_k = U_{k\,(m^3)} \quad \text{.... (11.13.1)}$$

$$U_k = U_{k\,(acf)} \quad \text{.... (11.13.2)}$$

(c) Liquid

Q_f (Flowrate):

$$U_k = U_{k\,(m^3)} \quad \text{.... (11.14.1)}$$

$$U_k = U_{k\,(acf)} \quad \text{.... (11.14.2)}$$

M (Mass flowrate):

$$U_k = \rho_f \times U_{k\,(kg)} \quad \text{.... (11.15.1)}$$

$$U_k = 7.481 \times \rho_f \times U_{k\,(lb)} \quad \text{.... (11.15.2)}$$

Note: 7.481 is a conversion factor of U.S gal into acf

(d) User's unit

$$U_k = U_{k\,(user)} \quad \text{..... (11.16)}$$

$U_{\rho f}$: Density unit conversion factor

$U_{k(kg)}$, $U_{k(Nm^3)}$, $U_{k(m^3)}$,

$U_{k(lb)}$, $U_{k(scf)}$, $U_{k(acf)}$: Flow rate unit conversion factor

(3) Mass Flow calculation

(a) Steam

In case of saturated steam, mass flow rate is calculated from density values to temperature measured by using saturated steam table.

In case of superheat steam, mass flow rate is calculated from density values to temperature measured by using steam table. In order to measure superheat steam, it is necessary to make constant pressure value. A pressure values which is entered in parameter is used.

$$M = \rho_{ft} \times Q_f \quad \text{..... (11.17)}$$

(b) Gas

In case of gas, Volumetric flow rate at standard condition is calculated, so Pressure-Temperature correction is carried out. It is necessary to make constant pressure value. A Pressure values at operational condition, temperature and pressure value at standard condition which is entered in parameter is used.

$$Q_n = Q_f \times \frac{P_f}{P_n} \times \frac{T_n + 273.15}{T_{ft} + 273.15} \times \frac{1}{K} \quad \text{..... (11.18)}$$

(c) Liquid

In case of liquid, mass flow rate is calculated from which used to calculate the secondary function for the density value to the temperature. A density value which indicated by the order sheet is used.

$$M = \rho_n \times Q_f \times \{1 + a_1 \times (T_{ft} - T_n) \times 10^{-2} + a_2 \times (T_{ft} - T_n)^2 \times 10^{-6}\} \quad \text{..... (11.19)}$$

[Footnote]

$$a_1 = \{(k_1 - 1) \times \Delta T_2^{\,2} - (k_2 - 1) \times \Delta T_1^{\,2}\} / \{(\Delta T_1 \times \Delta T_2^{\,2} - \Delta T_2 \times \Delta T_1^{\,2}) \times 10^{-2}\}$$

$$a_2 = \{(k_1 - 1) \times \Delta T_2 - (k_2 - 1) \times \Delta T_1\} / \{(\Delta T_1^{\,2} \times \Delta T_2 - \Delta T_2^{\,2} \times \Delta T_1) \times 10^{-6}\}$$

$$k_x = 1 + a_1 \times \Delta T_x \times 10^{-2} + a_2 \times \Delta T_x^{\,2} \times 10^{-6}$$

$$\Delta T_x = T_x - T_n$$

(x = 1, 2)

Where

M : Mass flow
Q_n : Volumetric flow rate at standard condition
Q_f : Volumetric flow rate at oprtating condition
T_n : Temperature at operating condition (°C), (°F)
T_f : Temperature at standard condition (°C), (°F)
T_{ft} : Measured temperature value (°C), (°F)
P_f : Pressure at operating condition (kPa abs), (psi)
P_n : Pressure at standard condition (kpa abs), (psi)
K : Deviation factor
ρ_{ft} : Density calculated by temperature value
ρ_n : Density at standard condition (kg/m^3), (lb/cf)
ρ_f : Density at operating condition
U_{pf} : Density unit conversion factor
$U_{k(kg)}$, $U_{k(Nm^3)}$, $U_{k(m^3)}$: Flow rate unit conversion factor
a_1 : 1st temperature coefficient
a_2 : 2nd temperature coefficient

Example: conversion factor in kg.

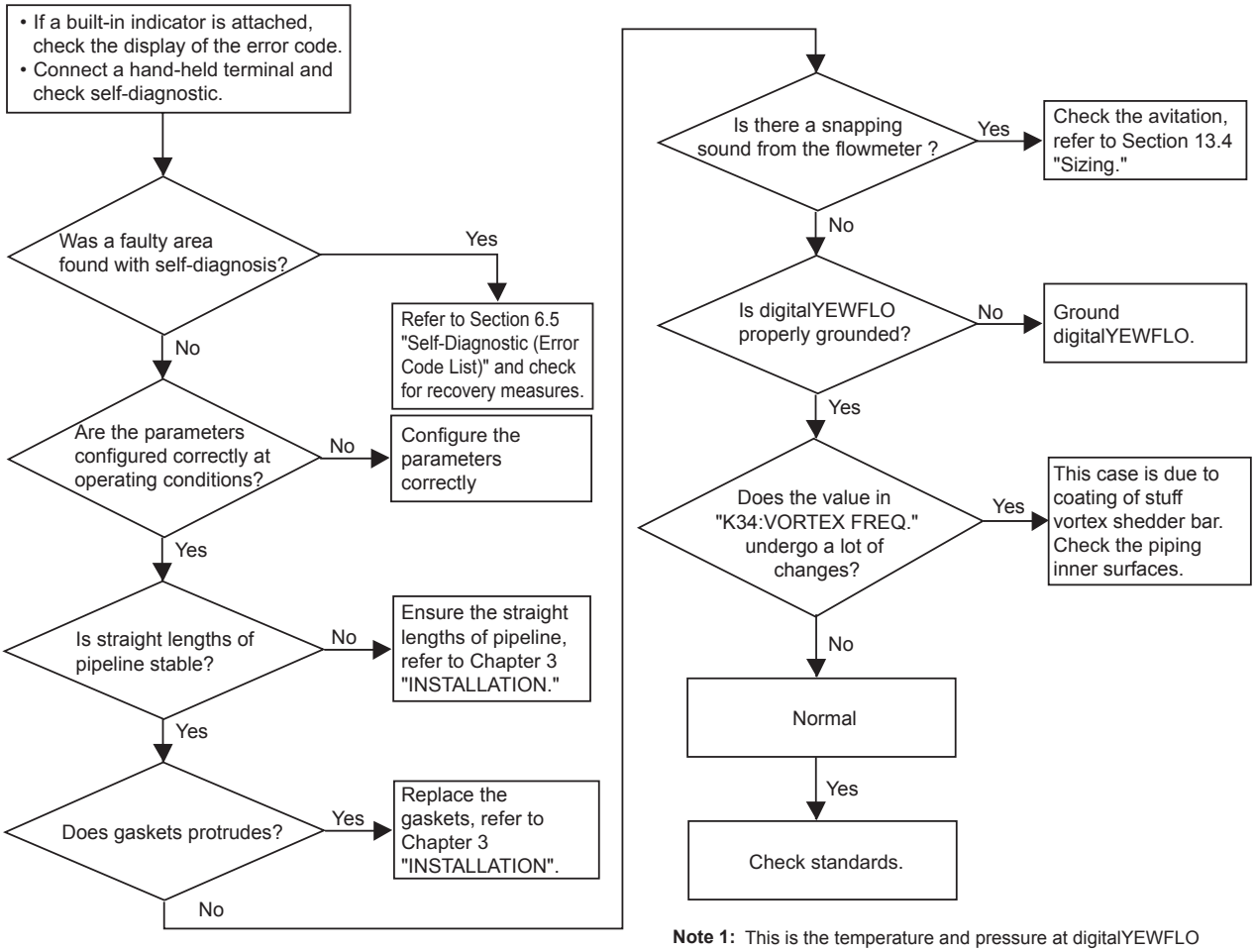
kg : $U_{k(kg)}$ =1
ton : $U_{k(kg)}$ =0.001

12. TROUBLESHOOTING

CAUTION

Please avoid replacing the amplifier unit from the case, and the vortex shedder bar. When these procedures are needed, please contact the nearest Yokogawa office.

12.1 Large Errors or Unstable Output


• If a built-in indicator is attached, check the display of the error code.
• Connect a hand-held terminal and check self-diagnostic.
Was a faulty area found with self-diagnosis?
Yes
Refer to Section 6.5 "Self-Diagnostic (Error Code List)" and check for recovery measures.
No
Are the parameters configured correctly at operating conditions?
No
Configure the parameters correctly
Yes
Is straight lengths of pipeline stable?
No
Ensure the straight lengths of pipeline, refer to Chapter 3 "INSTALLATION."
Yes
Does gaskets protrudes?
Yes
Replace the gaskets, refer to Chapter 3 "INSTALLATION".
No
Is there a snapping sound from the flowmeter ?
Yes
Check the avitation, refer to Section 13.4 "Sizing."
No
Is digitalYEWFLO properly grounded?
No
Ground digitalYEWFLO.
Yes
Does the value in "K34:VORTEX FREQ." undergo a lot of changes?
Yes
This case is due to coating of stuff vortex shedder bar. Check the piping inner surfaces.
No
Normal
Yes
Check standards.

Note 1: This is the temperature and pressure at digitalYEWFLO mounted place.
Note 2: Contact with our service in case this is not carried out into the right statement.

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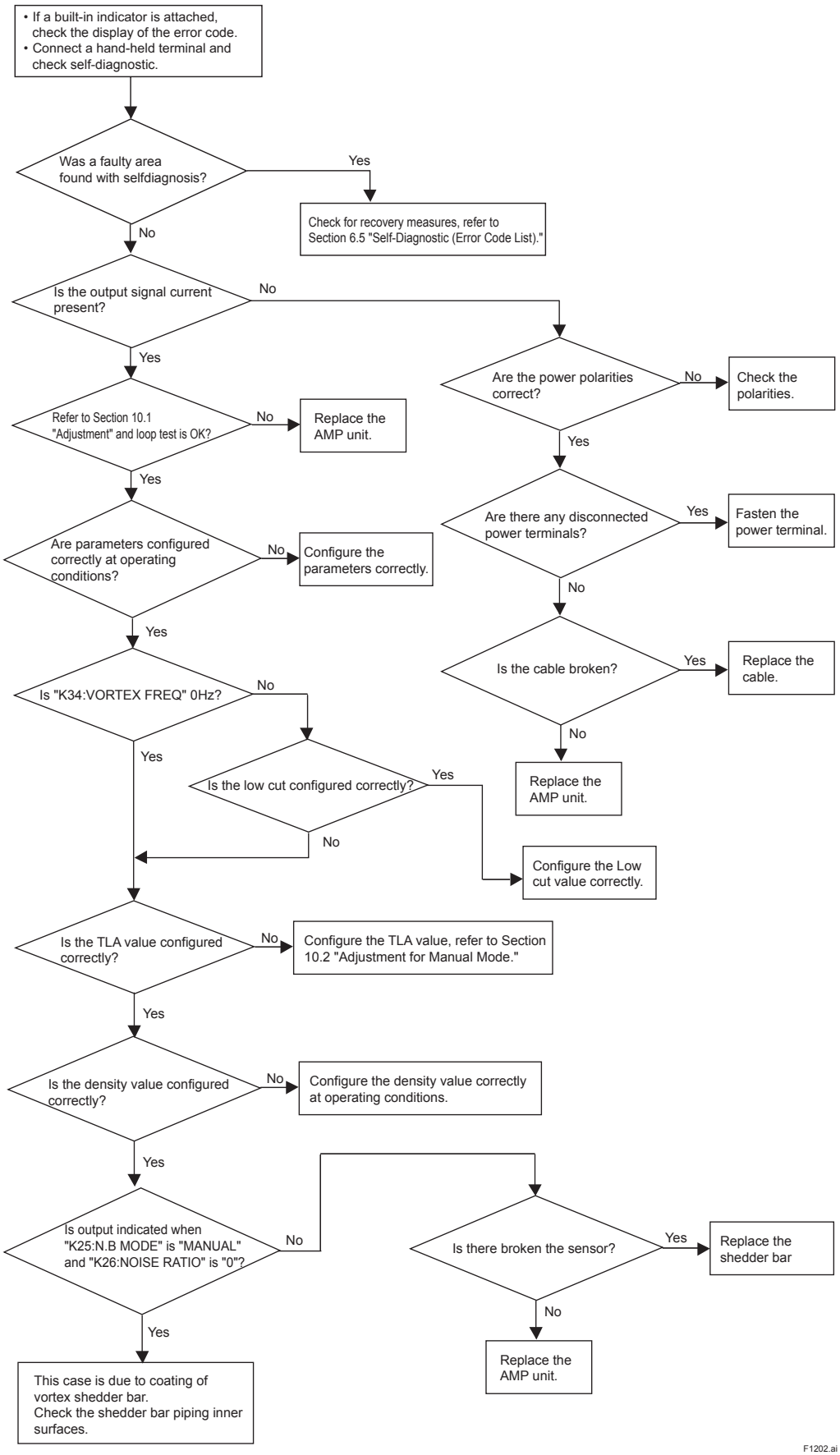
12.2 The Indication Goes to Zero at Certain Time

When this problem occurred, the cause is suspected of deterioration of sensor sensitivity and turbulent of fluid flow due to coating on the shedder bar and flowmeter inner tube.

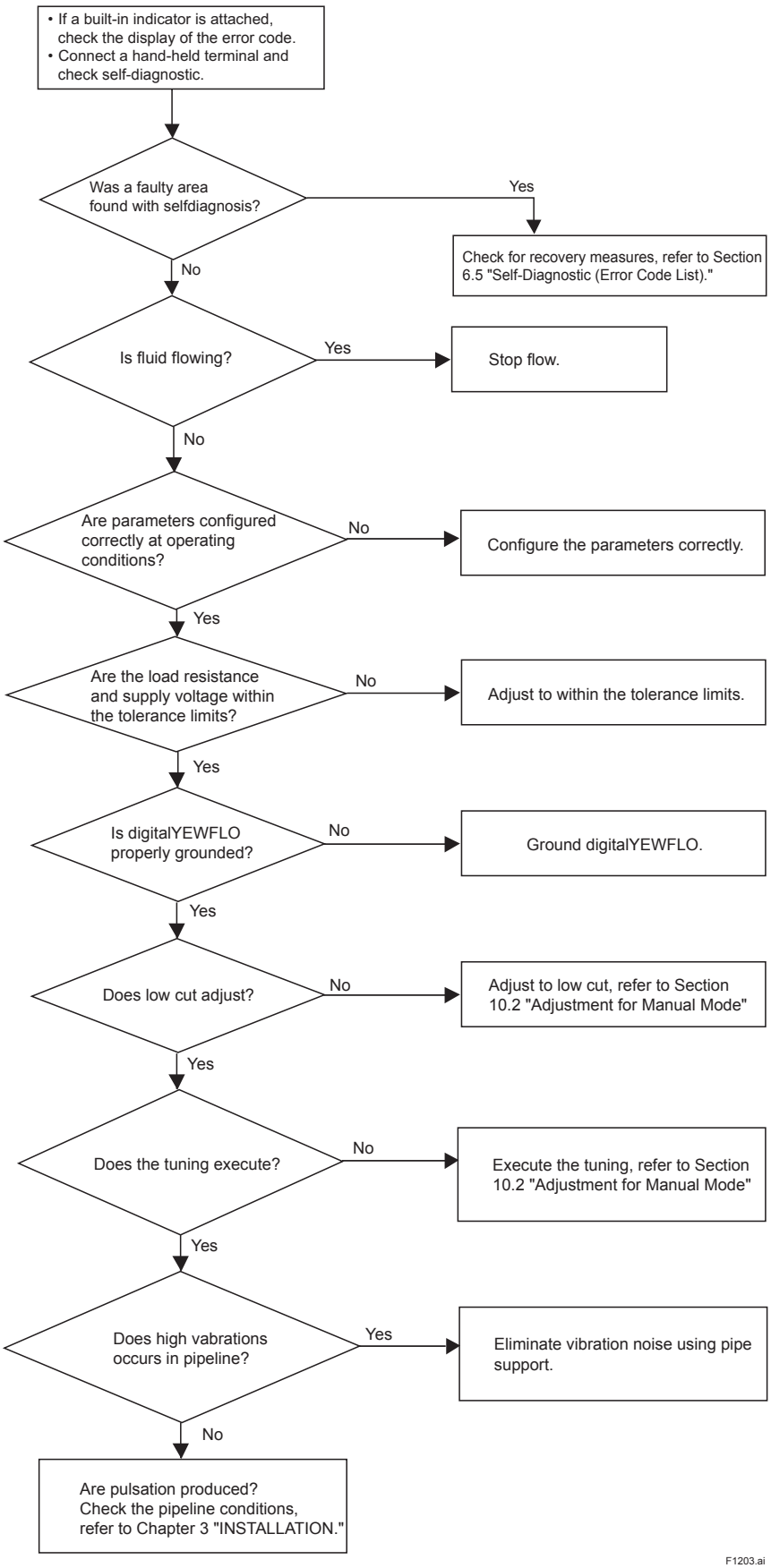
How to cope with this problem

1) Refer to Section 11.5 “Vortex Shedder Removal,” take out the Vortex Shedder bar and clean it.
2) If there is the coating on inner tube of the flowmeter, remove the flowmeter body from adjacent pipes and clean it.

12.3 No Output When The Fluid is Flowing



12.4 Output is Indicated at Zero Flow


• If a built-in indicator is attached, check the display of the error code.
• Connect a hand-held terminal and check self-diagnostic.
Was a faulty area found with selfdiagnosis?
Yes
Check for recovery measures, refer to Section 6.5 "Self-Diagnostic (Error Code List)."
No
Is fluid flowing?
Yes
Stop flow.
No
Are parameters configured correctly at operating conditions?
No
Configure the parameters correctly.
Yes
Are the load resistance and supply voltage within the tolerance limits?
No
Adjust to within the tolerance limits.
Yes
Is digitalYEWFLO properly grounded?
No
Ground digitalYEWFLO.
Yes
Does low cut adjust?
No
Adjust to low cut, refer to Section 10.2 "Adjustment for Manual Mode"
Yes
Does the tuning execute?
No
Execute the tuning, refer to Section 10.2 "Adjustment for Manual Mode"
Yes
Does high vabrations occurs in pipeline?
Yes
Eliminate vibration noise using pipe support.
No
Are pulsation produced? Check the pipeline conditions, refer to Chapter 3 "INSTALLATION."
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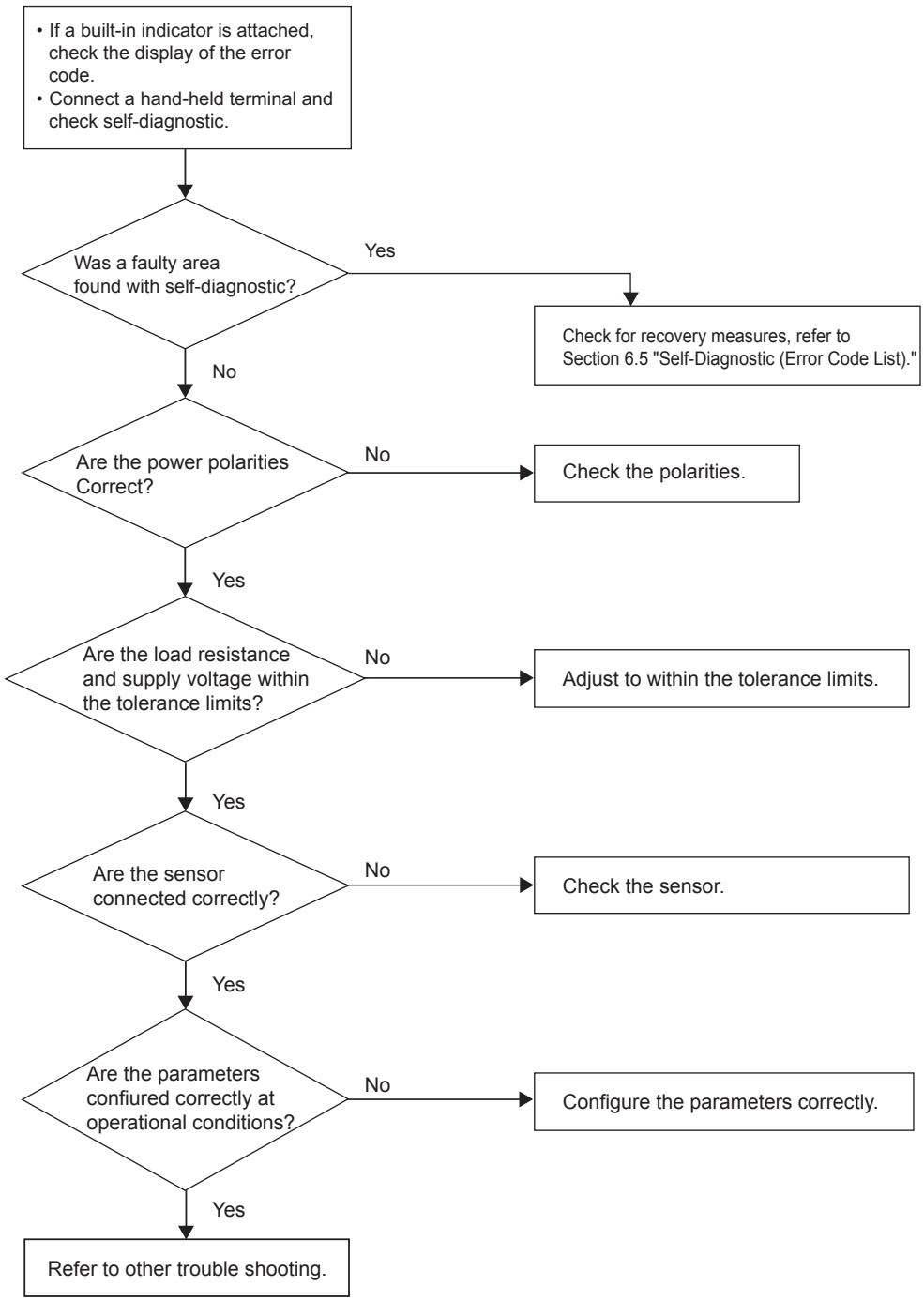
12.5 Multi-Variable Type (/MV)


• If a built-in indicator is attached, check the display of the error code.
• Connect a hand-held terminal and check self-diagnostic.
Was a faulty area found with self-diagnostic?
Yes
Check for recovery measures, refer to Section 6.5 "Self-Diagnostic (Error Code List)."
No
Are the power polarities Correct?
No
Check the polarities.
Yes
Are the load resistance and supply voltage within the tolerance limits?
No
Adjust to within the tolerance limits.
Yes
Are the sensor connected correctly?
No
Check the sensor.
Yes
Are the parameters confiured correctly at operational conditions?
No
Configure the parameters correctly.
Yes
Refer to other trouble shooting.

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13. GENERAL SPECIFICATIONS

13.1 Standard Specifications

■ Communication function includes FOUNDATION fieldbus, BRAIN and HART protocol.
Refer to GS 01F06F01-01EN for Fieldbus communication type marked with "◇".

Performance Specifications

Fluid to be Measured:
Liquid, Gas, Steam (Avoid multiphase flow and sticky fluids)

Measuring Flow Rates:
Refer to Table 13.6

Accuracy: ±0.75% of Reading (Liquid)
±1% of Reading (Gas, Steam)
Refer to Section 13.5 "Detailed Accuracy."
/MV: Refer to Subsection 13.3.1 "Option Multi-Variable (Built-In Temperature Sensor) Type (/MV)."

Repeatability: ± 0.2% of Reading

Calibration:
This flowmeter is factory-calibrated using a water flow.
Temperature and flow calibration by water flow when Multi-Variable Type is selected.

Normal Operating Condition

Process Temperature Range:
–29 to +250 °C (Standard)
–196 to +100 °C (Cryogenic Version: Option)
–29 to +450 °C (High Process Temperature Version: Option)
–29 to +400 °C (High Process Temperature Version Multi-Variable Type: Option)
When Multi-Variable Type is selected, refer to Subsection 13.3.1 "Option Multi-Variable (Built-In Temperature Sensor) Type (/MV)."
Refer to Figure 13.1 for integral type.

Process Pressure Limit:
–0.1MPa (–1 kg/cm^2) to flange rating.

Ambient Temperature Range:
–29 to +85 °C (Remote Type detector)
–40 to +85 °C (Remote Type converter)
–29 to +85 °C (Integral Type, refer to Figure 13.1)
–29 to +80 °C (Integral Type with Indicator, refer to Figure 13.1)
–30 to +80 °C (Remote Type converter with Indicator)

Ambient Humidity: 5 to 100% RH (at 40 °C) (No Condensation)

Power Supply Voltage (◇): 10.5 to 42 V DC
10.5 to 30 V DC (Lightning Protector: option)
(Refer to Figure 13.2 ; Relationship Between Power Supply Voltage and Load Resistance)

Mechanical Specifications

Material (Standard Type):
Refer to Table.13.1

Wetted Parts:
Body*1; Stainless steel JIS SCS14A, ASTM CF8M
*1 Flange materials for DY250 to DY400 are JIS SUS F304
Shedder Bar; Duplex stainless steel
Size 15mm ASTM S31803
Size 25mm to 400mm EN 1.4517
Gasket: JIS SUS316 stainless steel with polytetrafluoroethylene (Teflon) coating.

Non-Wetted Parts:
Housing (Case, Cover):
Aluminum alloy JIS ADC12
Name Plate: Stainless steel JIS SUS304
DYA Mounting Bracket for 2B pipe:
Carbon steel sheet JIS SPCC, JIS SECC

Coating Color:
Housing:
Polyurethane corrosion-resistant coating
Deep sea moss green (Munsell 0.6GY 3.1/2.0)
DYA Mounting Bracket for 2B pipe:
Polyurethane corrosion-resistant coating
Frosty white (Munsell 2.5Y 8.4/1.2)

Degree of Protection:
IP66/IP67 (IEC 60529), Type 4X (NEMA 250)

Type of Protection:
Refer to Section 13.3 "Option Specifications".

Electrical Connection:
JIS G1/2 female, ANSI 1/2 NPT female, ISO M20 × 1.5 female

Signal Cable:
Model DYC signal cable, used for remote detector and converter.
Signal cable length is up to 30 m.
Outer Sheath Material: Heat resisting polyethylene
Durable Temperature: –40 to +150 °C

Weight:

Refer to Section 13.7 “External Dimensions”.

Mounting:

Integral type and Remote type detector:
Flange mounting or wafer mounting by flange adjacent to the pipeline.

Remote type converter: 2 inch pipe mounting.

Electrical Specifications

Note*: Pulse output,alarm output and status output use the common terminal, therefore these functions are not used simultaneously.

Output Signal (◇): Dual Output (Both Analog and Transistor contact output can be obtained simultaneously). In this case refer to Section 3.2 “Piping Precautions” for power supply and pulse output wiring.

Analog: 4 to 20 mA DC, 2-wire system.

Transistor Contact Output*:

Open collector, 3-wire system.

Pulse,alarm,status output are selected by parameter setting.

Contact rating: 10.5 to 30 V DC, 120 mA DC*1

Low level: 0 to 2 V DC. (refer to Figure 13.3)

*1: 10.5 to 30V DC, 80mA DC for ATEX Intrinsically Safe Approval (/KS2) and IECEx Intrinsically Safe Approval (/SS2)

Communication Requirements:

Communication Signal:

BRAIN or HART communication signal (superimposed on a 4 to 20 mA DC signal)

Note: HART is a registered trademark of the HART Communication Foundation.

Conditions of Communication Line:

Load Resistance:

250 to 600 Ω(including cable resistance).
Refer to Figure 13.2.

Supply Voltage:

16.4 to 42 V DC for digital communications BRAIN and HART protocols. (16.4 to 30 V DC for intrinsically safe type).
Refer to Figure 13.2.

BRAIN:

Space from other Power Line: 15cm or more (Parallel wiring should be avoided.)

Communication Distance:

Up to 2 km,when polyethylene insulated PVC-sheathed cables (CEV cables) are used. Communication distance varies depending on type of cable used and wiring.

Load Capacitance: 0.22 μF or less

Load Inductance: 3.3 mH or less

Input Impedance Communicating Device:

10 kΩ or more at 2.4 kHz.

Selection of HART 5/ HART 7

Output Signal Code		-E	-J	
Ordering Information		—	Specify “5”	Specify “7”
HART Protocol Revision		HART 5		HART 7
Selection guide	Requirement for HART 7 functionarlity	NO		YES Be sure to confirm the protocol revision of the HART configuration tool shown in *2.
	Other conditions	Not available to switch to HART 7 protocol after delivery.	Available to switch to HART 7 protocol after delivery by userconfiguration.	—
Remarks		*1	*2	*2

*1: “-E” is HART5 exclusive model and will be terminated. “-J” is recommended for HART communication.

*2: HART protocol revision for the device and HART configuration tool HART7 communication is supported by FieldMate R2.02 or later.

HART protocol revision and availability

	Protocol revision supported by HART configuration tool	
	5	7
DY or DYA HART 5	Available	Available
DY or DYA HART 7	Not Available	Available

Note: Protocol revision supported by HART configuration tool must be the same or higher than that of the digitalYEWFLO.

Functions:

Damping Time Constant:

0 to 99 Sec (63% response time)

Note: Delay time is 0.5 Sec.
Analog output circuit time constant is 0.3 Sec.

Pulse Output Function*:

Pulse output is selected from scaled pulse, unscaled pulse, frequency (number of pulses output per second at 100% of output).

Pulse frequency: Max 10 kHz

Duty cycles: Approx.50% (1:2 to 2:1)

Self-diagnostics and Alarm Output *:

In case alarm (over range output signal, EEPROM error, vibration noise, abnormal flow such as clogging, bubble) occurs, an alarm signal is output and indicated.

The alarm signal output goes from close(ON) to open(OFF) during alarming.

Analog Output Function:

Analog output is selected from flowrate and temperature value when option code /MV is selected.

Status Output Function*:

Flow Switch:

In case flow rate decreases under the flow set value,a status signal is output.

Status signal output mode can reverse (ON/OFF).

Data Security During Power Failure:

Data (parameter, totalizer value, etc) storage by EEPROM. No back-up battery required.

Correction:

Instrument Error Correction:

Vortex flowmeter instrument errors can be corrected by segment approximations.

Reynolds Number Correction:

Output error at Reynolds number 20000 or less is corrected by using five-break-point line-segment approximation.

Gas Expansion Correction:

When measuring a compressibility gas and steam, this expansion factor is useful to correct the error at high velocity of flow (35m/s or more).

Down-scale or Up-scale burn out.

In case a CPU or EEPROM failure occurs, flow meter output the signal of Up-scale (21.6 mA or more).

Up-scale or Down-scale (3.6 mA or less) is user-selectable through the fail mode alarm jumper.

Indicator:

Flow rate (% or engineering units) or temperature value and totalizer can be indicated simultaneously.

Short message for self diagnostics indicated.

Local parameter setting can be operated by key switches.

In mounting direction, the right and left 90° is rotatable.

EMC Conformity Standards:

EN 61326-1: 2006 Class A, Table 2 (For use in industrial locations), EN 61326-2-3: 2006

Note1: This instrument is a Class A product, and it is designed for use in the industrial environment. Please use this instrument in the industrial environment only.

Note2: Use the metal conduit for the remote cable.

Pressure Equipment Directive:

Type of equipment: piping

Type of fluid: liquid and gas

Group of fluid: 1 and 2

Module: H

MODEL	DN(mm)*	PS(MPa)*	PS·DN(MPa·mm)	CATEGORY**
DY015	15	42	630	Article 3, Paragraph 3 (SEP)
DY025	25	42	1050	Article 3, Paragraph 3 (SEP)
DY040	40	42	1680	II
DY050	50	42	2100	II
DY080	80	42	3360	II
DY100	100	42	4200	II
DY150	150	42	6300	III
DY200	200	42	8400	III
DY250	250	42	10500	III
DY300	300	42	12600	III
DY400	400	25	10000	III

* PS: Maximum allowable pressure for Flow tube, DN: Nominal size

** Refered to Table 6 coverd by ANNEX II of EC Directive on Pressure Equipment Directive 97/23/EC

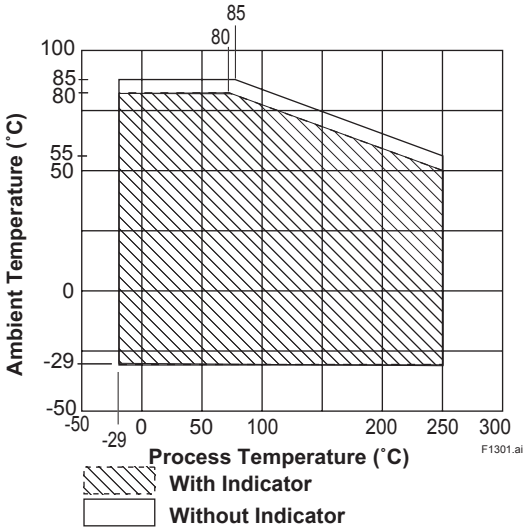


Figure 13.1 Ambient Temperature limit (Integal Type)

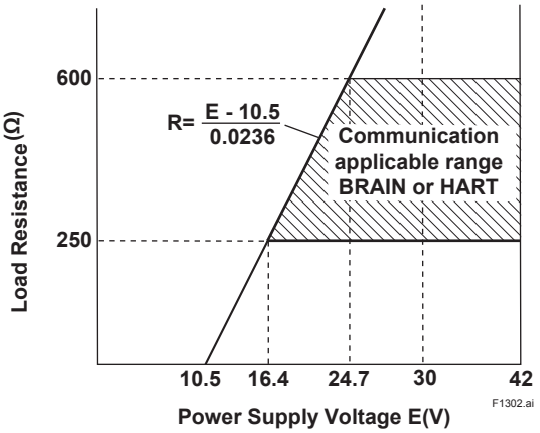


Figure 13.2 Relationship Between Power Supply and Load Resistance

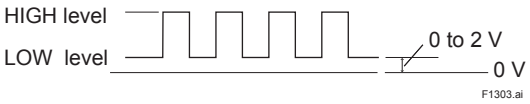


Figure 13.3 High and low level (Pulse output)

13.2 Model And Suffix Codes

DY Vortex Flowmeter (Integral Type, Remote Type detector)

Model	Suffix Codes	Description
DY015	·····	Size 15 mm (1/2 inch)
DY025	·····	Size 25 mm (1 inch)
DY040	·····	Size 40 mm (1-1/2 inch)
DY050	·····	Size 50 mm (2 inch)
DY080	·····	Size 80 mm (3 inch)
DY100	·····	Size 100 mm (4 inch)
DY150	·····	Size 150 mm (6 inch)
DY200	·····	Size 200 mm (8 inch)
DY250	·····	Size 250 mm (10 inch)
DY300	·····	Size 300 mm (12 inch)
DY400	·····	Size 400 mm (16 inch)
Output Signal /Communication	-D ·····	4 to 20 mA DC, Pulse, BRAIN Communication
	-E ·····	4 to 20 mA DC, Pulse, HART Communication *1
	-J ·····	4 to 20 mA DC, Pulse, HART 5/HART 7 Communication *2
	-F ·····	Digital communication (FOUNDATION Fieldbus protocol) *3
	-N ·····	Remote type detector
Body Material *6, *7	A ·····	JIS SCS14 A *4
	B ·····	ASTM CF8M *5
	X ·····	Others
Shedder bar Material *6, *7	L ·····	Duplex Stainless Steel
	B ·····	Stainless Steel
	E ·····	Duplex Stainless Steel (for TIIS Approval)
	X ·····	Others
Process Connection *8 RF: Raised Face SF: Smooth Finish RJ: Ring Joint	AJ1 ·····	JIS 10 K Wafer
	AJ2 ·····	JIS 20 K Wafer
	AJ4 ·····	JIS 40 K Wafer
	AA1 ·····	ANSI Class 150 Wafer
	AA2 ·····	ANSI Class 300 Wafer
	AA4 ·····	ANSI Class 600 Wafer
	AD1 ·····	DIN PN10 Wafer
	AD2 ·····	DIN PN16 Wafer
	AD3 ·····	DIN PN25 Wafer
	AD4 ·····	DIN PN40 Wafer
	BJ1 ·····	JIS 10K Flange(RF)
	BJ2 ·····	JIS 20K Flange(RF)
	BJ4 ·····	JIS 40K Flange(RF)
	BA1 ·····	ANSI Class 150 Flange(RF)
	BA2 ·····	ANSI Class 300 Flange(RF)
	BA4 ·····	ANSI Class 600 Flange(RF)
	BA5 ·····	ANSI Class 900 Flange(RF)
	BS1 ·····	ANSI Class 150 Flange(RF, SF)
	BS2 ·····	ANSI Class 300 Flange(RF, SF)
	BS4 ·····	ANSI Class 600 Flange(RF, SF)
	BS5 ·····	ANSI Class 900 Flange(RF, SF)
	BD1 ·····	DIN PN10 Flange(RF)
	BD2 ·····	DIN PN16 Flange(RF)
	BD3 ·····	DIN PN25 Flange(RF)
	BD4 ·····	DIN PN40 Flange(RF)
	CA4 ·····	ANSI Class 600 Flange(RJ)
	CA5 ·····	ANSI Class 900 Flange(RJ)
Electrical Connection *9	-0 ·····	JIS G 1/2 Female
	-2 ·····	ANSI 1/2 NPT Female *10
	-4 ·····	ISO M201.5 Female
Indicator *11	D ·····	With Indicator
	N ·····	None Indicator, Remote type detector
Options	/□	Refer to Option Specifications

DYA Vortex Flowmeter Converter(Remote Type)

Model	Suffix Codes	Description
DYA	·····	Vortex Flowmeter Converter (Remote Type)
Output Signal /Communication	-D ·····	4 to 20 mA DC, Pulse BRAIN Communication
	-E ·····	4 to 20 mA DC, Pulse HART Communication *1
	-J ·····	4 to 20 mA DC, Pulse HART 5/HART 7 Communication *2
	-F ·····	Digital communication (FOUNDATION Fieldbus protocol) *3
Electrical Connection *9	0 ·····	JIS G 1/2 Female
	2 ·····	ANSI 1/2 NPT Female *10
	4 ·····	ISO M20 ×1.5 Female
Indicator	D ·····	With Indicator
	N ·····	None Indicator
Options	/□	Refer to Option Specifications
	/MV	Multi-Variable Type *12

DYC Signal Cable

Model	Suffix Codes	Description
DYC	·····	Signal Cable
Cable End	-0 ·····	Without End finish *13
	-1 ·····	With End finish
Cable Length *14	-05 ·····	5 m
	-10 ·····	10 m
	-15 ·····	15 m
	-20 ·····	20 m
	-25 ·····	25 m
	-30 ·····	30 m
	-35 ·····	35 m
	-40 ·····	40 m
	-45 ·····	45 m
	-50 ·····	50 m
	-55 ·····	55 m
	-60 ·····	60 m
	-65 ·····	65 m
	-70 ·····	70 m
	-75 ·····	75 m
	-80 ·····	80 m
	-85 ·····	85 m
	-90 ·····	90 m
	-95 ·····	95 m
Options	/C1 ·····	Cable End Finish Parts 1 set
	/C2 ·····	2 set
	/C3 ·····	3 set
	/C4 ·····	4 set
	/C5 ·····	5 set
	/C6 ·····	6 set
	/C7 ·····	7 set
	/C8 ·····	8 set
	/C9 ·····	9 set
	/MV ·····	Multi-Variable Type

*1: Output signal code '-E': HART 5. (Output signal code '-J' is recommended for HART communication.)
*2: Output signal code '-J': HART 5 or HART 7 selectable. Specify HART 5 or HART 7 when ordering.
*3: For FOUNDATION Fieldbus protcol, refer to GS 01F06F01-01EN. For Fieldbus communication type, there are not setting keys on the display board.
*4: In case of A (JIS SCS14A), the process connection is available for JIS (AJ□, BJ□)
*5: In case of B (ASTM CF8M), the process connection is available for ANSI (AA□, BA□, BS□, CA□) and DIN (AD□, BD□).
*6: Refer to Table 13.1.
*7: Users must consider the characteristics of selected wetted parts material and the influence of process fluids. The use of inappropriate materials can result in the leakage of corrosive process fluids and cause injury to personnel and/or damage to plant facilities. It is also possible that the instrument itself can be damaged and that fragments from the instrument can contaminate the user's process fluids.
Be very careful with highly corrosive process fluids such as hydrochloric acid, sulfuric acid, hydrogen sulfide, sodium hypochlorite, and hightemperature steam (+150°C [+302°F] or above). Contact Yokogawa for detailed information of the wetted parts material.
*8: Refer to Table 13.2.
*9: In case of an explosion protect type, it depends for an electrical connecion on the kind of an explosion protect type. Refer to Section 13.6 "Option Specifications (For Explosion Protected Type)".
*10: In case of /FF1 or /CF1, CF11, /KF2, /KS2, /SF2, /SS2 the screw length is deeper than ANSI standard for 0.5 to 2 threads.
*11: Indicator is not available for remote type detector.
*12: DYA-□□□/MV and DY□□□-N***/MV should be combined.
*13: One set of end finish part is attached.
*14: DYC Signal Cable can be used up to 30m. When you divide the cable below 30m, select the Cable End code [-0].

Table 13.1 Body, Shedder Bar and Gasket Material

Body Material

Model Code (Note3)			Standard (Note1)	Anti-Corrosion Version II (/HY) (Note2)	High Process Temperature Version (/HT) (Note2)	Cryogenic Version (/LT) (Note2)	NACE Material (/NC)
DY015	DY025/R1	DY040/R2	**A** JIS SCS14A **B** ASTM CF8M	**X** (Note2) JIS SCS14A ASTM CF8M	—	**X** (Note2) DIN1.4308 (JIS SCS13)	**X** ASTM CF8M
DY025	DY040/R1	DY050/R2			**X** (Note2) JIS SCS14A ASTM CF8M		
DY040	DY050/R1	DY080/R2					
DY050	DY080/R1	DY100/R2					
DY080	DY100/R1	DY150/R2					
DY100	DY150/R1	DY200/R2					
DY150	DY200/R1	—		—		—	
DY200	—	—		—		—	
DY250	—	—		—		—	—
DY300	—	—		—		—	—
DY400	—	—		—		—	—

(Note1) In case of the suffix code of the body material is [A], the code of the process connection is for one of AJ□,BJ□ or BP□.
In case of the code [B], process connection code is for one of AA□,BA□,BS□,CA□,AD□ or BD□.
(Note2) In cases of option code /HY, /HT, /LT or /NC, select [X] for both body material code and select shedder bar material code in accordance with the shedder bar material chart.
(Note3) Reduced bore type is Flange type only.

Shedder Bar Material

Model Code (Note3)			Standard	TIIS Flame proof approval (/JF3) (Note2)	Anti-corrosion version II (/HY) (Note1,2)	High Process Temperature Version (/HT) (Note1,2)	Cryogenic Version (/LT) (Note1,2)	NACE Material (/NC) (Note1,2)
DY015	DY025/R1	DY040/R2	**L** ASTM S31803	**E** ASTM S31803	**X** ASTM N10276	—	**X** ASTM N10276	**X** ASTM N10276
DY025	DY040/R1	DY050/R2	**L** EN1.4517	**E** EN1.4517	**X** ASTM CW-12MW	**X** ASTM CW-12MW	**X** ASTM CW-12MW	**X** ASTM CW-12MW
DY040	DY050/R1	DY080/R2						
DY050	DY080/R1	DY100/R2						
DY080	DY100/R1	DY150/R2						
DY100	DY150/R1	DY200/R2						
DY150	DY200/R1	—	**L** EN1.4517	**E** EN1.4517	—	**X** ASTM CW-12MW or **B** ASTM CF8M (Note4) (Note6)	—	**X** ASTM CW-12MW or **B** ASTM CF8M (Note4)
DY200	—	—			—		—	
DY250	—	—			—	**B** ASTM CF8M (Note5) (Note6)	—	—
DY300	—	—			—		—	—
DY400	—	—	**B** CF8M	**B** CF8M	—		—	—

(Note1) Select body code [X] for /HY, /HT, /LT and /NC.
Available to combine with TIIS Flame proof type /JF3 or Multi-Variable type /MV.
(Note2) The shedder bar code [E] is for TIIS Flame proof type /JF3 only.
Select shedder bar code [X] for DY025 to DY200 when you combine TIIS Flame proof type /JF3 with /HY, /HT, /LT or /NC.
(Note3) Wafer type (Process Connection: A**): DY015 to DY100, Flange type (Process Connection: B**): DY015 to DY400
Reduced bore type is Flange type only.
(Note4) Shedder bar code [X] or [B] is selectable for DY150/HT, DY150/NC, DY200/HT and DY200/NC.
(Note5) Select shedder bar code only [B] for DY250/HT to DY400/HT.
(Note6) Available to combine with TIIS Flame proof type /JF3, High Process Temperature Version (/HT) and shedder bar code [B] as TOKUCHU.

Gasket Material

Model Code (Note1)			Standard	Anti-corrosion Version II (/HY)	High Process Temperature Version (/HT)	Cryogenic Version (/LT)	NACE Material (/NC)
DY015	DY025/R1	DY040/R2	JIS SUS316 stainless steel with polytetra-fluoroethylene (Teflon) coating	JIS SUS316 stainless steel with polytetra-fluoroethylene (Teflon) coating	—	JIS SUS316 stainless steel with polytetra-fluoroethylene (Teflon) coating	JIS SUS316 stainless steel with polytetra-fluoroethylene (Teflon) coating
DY025	DY040/R1	DY050/R2			JIS SUS316 stainless steel plated with silver		
DY040	DY050/R1	DY080/R2					
DY050	DY080/R1	DY100/R2					
DY080	DY100/R1	DY150/R2					
DY100	DY150/R1	DY200/R2					
DY150	DY200/R1	—		—		—	
DY200	—	—		—		—	
DY250	—	—		—		—	—
DY300	—	—		—		—	—
DY400	—	—		—		—	—

(Note1) Wafer type (Process Connection: A□□): DY015 to DY100, Flange type (Process Connection: B□□): DY015 to DY400
Reduced bore type is Flange type only.

Table 13.2 Flowmeter Selection Guide

Process Connection	Wafer				Flange (Raised Face)				Flange (Ring Joint)				Flange (Raised Face, Smooth Finish)			
	Suffix Code	Model Code			Suffix Code	Model Code			Suffix Code	Model Code			Suffix Code	Model Code		
JIS 10 K	AJ1	DY015 to DY100	—	—	BJ1	DY015 to DY400	DY025/R1 to DY200/R1	DY040/R2 to DY200/R2	—	—	—	—	—	—	—	—
JIS 20 K	AJ2	DY015 to DY100	—	—	BJ2	DY015 to DY400	DY025/R1 to DY200/R1	DY040/R2 to DY200/R2	—	—	—	—	—	—	—	—
JIS 40 K	AJ4	DY015 to DY100	—	—	BJ4	DY015 to DY150	—	—	—	—	—	—	—	—	—	—
ANSI Class 150	AA1	DY015 to DY100	—	—	BA1	DY015 to DY400	DY025/R1 to DY200/R1	DY040/R2 to DY200/R2	—	—	—	—	BS1	DY015 to DY400	DY025/R1 to DY200/R1	DY040/R2 to DY200/R2
ANSI Class 300	AA2	DY015 to DY100	—	—	BA2	DY015 to DY400	DY025/R1 to DY200/R1	DY040/R2 to DY200/R2	—	—	—	—	BS2	DY015 to DY400	DY025/R1 to DY200/R1	DY040/R2 to DY200/R2
ANSI Class 600	AA4	DY015 to DY100	—	—	BA4	DY015 to DY200	—	—	CA4	DY015 to DY200	—	—	BS4	DY015 to DY200	—	—
ANSI Class 900	—	—	—	—	BA5	DY015 to DY200	—	—	CA5	DY015 to DY200	—	—	BS5	DY015 to DY200	—	—
DIN PN10	AD1	DY015 to DY100	—	—	BD1	DY015 to DY200	—	—	—	—	—	—	—	—	—	—
DIN PN16	AD2	DY015 to DY100	—	—	BD2	DY015 to DY200	—	—	—	—	—	—	—	—	—	—
DIN PN25	AD3	DY015 to DY100	—	—	BD3	DY015 to DY200	—	—	—	—	—	—	—	—	—	—
DIN PN40	AD4	DY015 to DY100	—	—	BD4	DY015 to DY200	—	—	—	—	—	—	—	—	—	—

(Note)
- ANSI standardized types are worked by serration finishing except the Smooth Finish type.
- The Smooth Finish type is shipped without serration finishing.
- Refer to Subsection 13.3.2 “Option Reduced Bore Type (/R1, /R2)”, when you select reduced bore type /R1, /R2.

13.3 Option Specifications

Item	Specification		Applicable Model	Code
Multi-Variable Type (Note 5)	Build in Temperature sensor (Pt 1000) in vortex shedder bar.		DY / DYA	MV
Reduced bore type (Note 8) (Note 12)	Integrated and welded construction with concentric reduced bore piping. R1: Detector size (B) is one meter body size down of digitalYEWFLO to flange pipe size (A).		DY	R1
	R2: Detector size (B) is two meter body size down of digitalYEWFLO to flange pipe size (A).			R2
Stainless Steel Tag Plate (Note 1)	JIS SUS304 tag plate, hung on the case.		DY / DYA	SCT
Stainless Steel Bolt & Nut Assembly	JIS SUS304 bolt/nut assembly. Used when a wafer type is installed.		DY Wafer Type	BL
Paint Color Change	Only for the covers: Refer to Table 13.3		DY / DYA	Refer to Table 13.3
Hydrostatic / Pneumatic Test Certificate	Test pressure value is in accordance with Table 13.4 Test time: 10 minutes. Available for the Standard type. Test medium: Air, Nitrogen or Water.		DY	T01 (Note 11)
Hydrostatic Test Certificate	Test pressure value is in accordance with Table 13.4 Test time: 10 minutes. Available for the Standard type. Test medium: Water.		DY	T02 (Note 11)
Degrease Treatment (Note 2)	Degrease cleansing treatment.		DY	K1
Epoxy Coating	Epoxy coating for case and cover.		DY / DYA	X1
Piling up coating of epoxy and polyurethane	Epoxy and Polyurethane coating for the purpose of corrosion - proof improvement; salt damage, alkali, climate and acidity		DY / DYA	X2
High Process Temperature Version	This specification temperature is from -29 to +450 °C Refer to Table 13.1, Figure 13.4. Refer to Table 13.5 for minimum velocity. Refer to Note 5 for the combination of High Process Temperature Version (/HT) and Multi-Variable Type (/MV).		DY***-N	HT
Cryogenic Version (Note 7)	This specification temperature is from -196 to +100 °C Refer to Table 13.1, Figure 13.5. /R1 and /R2 are not available.		DY***-N	LT
Stainless Steel Bracket for Remote Conveter (DYA)	The bracket material for remote converter type (DYA) is JIS SUS304.		DYA	SB
Lightning Protector	There is an arrester inside converter for power supply line. Maximum power supply voltage: 30VDC		DY Integral Type / DYA	A
NACE Material (Note 10)	Refer to Table 13.1.		DY	NC
Compliance with NAMUR (Note 6)	Compliance with NAMUR43. Current signal for measurement is 4mA up to 20.5mA. Set output 3.6mA or less when burn-out occurred.		DY / DYA	NM
Anti-corrosion Version II	Anti-corrosion Version II. Refer to Table 13.1. DY150/R1, DY150/R2, and DY200/R2 are not available.		DY	HY
Converter Installing Direction 180° Change (Note4)	Converter installing direction 180° change inversely when shipped.		DY	CRC
Down-scale burn-out in CPU or EEPROM failure (Note 3)	Set output 3.6mA or less when burn-out occurred.		DY Integral Type / DYA	C1
Stainless steel housing (Note 9)	Converter housing, case and cover material: JIS SCS14A or ASTM, ASME CF8M stainless steel castings. (equivalent to JIS SUS316)		DY***-N / DYA	E1
Flameproof Packing Adapter	Power source connection port and signal cable (remote type) connection port. JIS G1/2 female thread. Other cable shape: ø 8 to ø 12. /G11: One piece, /G12: Two pieces.		DY / JF3	G11
			DYA / JF3	G12
Calibration Certificate	Level 2	Declaration and Calibration Equipment List	DY / DYA	L2
	Level 3	Declaration and Primary Standard List	DY / DYA	L3
	Level 4	Declaration and YOKOGAWA Measuring	DY / DYA	L4
Material certificates: Mill sheets	Item to be specified	1. Meterbody	DY	M01
		1. Meterbody, 2. Shedder bar		M02
		1. Meterbody, 2. Shedder bar, 3. Bottom plug		M03
		1. Meterbody, 2. Shedder bar, 3. Bottom plug, 4. Welding rod		M04
Material certificates: 3.1	3.1 certificate to be attached according to EN10204.		DY	
	Item to be specified	1. Meterbody		E01
		1. Meterbody, 2. Shedder bar		E02
		1. Meterbody, 2. Shedder bar, 3. Bottom plug		E03
		1. Meterbody, 2. Shedder bar, 3. Bottom plug, 4. Welding rod		E04
PMI test certificate	Positive Material Identification certificate to be attached for the main 3 chemical components of specified materials. Each certificate to be attached.		DY	
	Item to be specified	1. Meterbody		PM1
		1. Meterbody, 2. Shedder bar		PM2
ASME welding documents submission (Note 10)	1. Welder/Welding Operator Performance Qualification (or Welder Qualification Record) 2. Welding Procedure Specification (WPS) 3. Procedure Qualification Record (PQR) Each certificate to be attached. The customer's name and job name to be specified when ordered.		DY	WP
	Item to be specified	1. Welded portion for the bottom plug 2. Welded portion for the flange in case of the welding construction		
Dye Penetrant test certificate	Dye Penetrant test certificate for the welded portion to be attached. Each certificate to be attached.		DY 2. is for DY250 to DY400.	PT
	Item to be specified	1. Welded portion for the bottom plug 2. Welded portion for the flange in case of the welding construction 3. Criterion: ASME B31.1		

(Note 1) Up to 30 alphanumeric characters can be engraved on the stainless tag plate. Capital/small letters are available for BRAIN communication "-D" and FOUNDATION Fieldbus "-F". Only capital letters are available for HART communication "-E" or "-J".
(Note 2) There is a case that calibration water should stay in the meter tube. So this is not degrease treatment in the strict sense.
(Note 3) The output is set 3.6mA or less (Standard type is set 21.6mA or more at shipping).
(Note 4) The electrical connection turn to a downstream side.

(Note 5) Refer to Subsection 13.3.1 “Option Multi-Variable (Built-In Temperature Sensor) Type (/MV)”
In case of Remote type detector (DY***-N), select “/MV” both DY and DYA.
(Note 6) /NM can not combine with Remote type (DY***-N).
(Note 7) ATEX Flameproof Approval /KF2 and IECEx Flameproof Approval /SF2 are not Available.
(Note 8) • Cryogenic version /LT is not available.
• High process temperature version /HT and Multi-variable type /MV for DY025/R1 and DY040/R2 is not available.
• Flange type only and available process connections are JIS10k, 20k (BJ1, BJ2) and ANSI class 150, 300 (BA1,BA2,BS1,BS2).
• Model Code (A) means “DY***-” nominal size.
(Note 9) • Applicable for Option code /FF1, /KF2, /KS2, /FS1, /SF2 and /SS2.
• Not applicable for Option code /P1, /P2, /P7, /X1, /X2, /HT, /LT, /SB /JF3, /FS1, /CF1, /CS1, /CF11 and /CS11.
• The materials of exterior parts, name plate, screw, bolts on the stainless steel housing and bracket, u-bolt, nuts for DYA/E1 and tag plate for /E1/SCT are JIS SUS316 or SUS316L.
(Note 10) The wetted parts materials conform to NACE material recommendations per MR0175.
NACE Material /NC can not combine with ASME welding documents submission /WP.
(Note 11) /T01 and /T02 can be selected only one code either.
(Note 12) Refer to Subsection 13.3.2 “Option Reduced Bore Type (/R1, /R2)”

Table 13.3 Paint Color and Codes

Codes	Munsell Renotation Code	Color
P1	N1.5	Black
P2	7.5BG4/1.5	Shade green
P7	————	Metallic silver

Table 13.4 Test Pressure Value

Flange Rating	Pressure
JIS 10 K	2.1 MPa
JIS 20 K	5.0 MPa
JIS 40 K	10.0 MPa
ANSI Class 150	2.9 MPa
ANSI Class 300	7.5 MPa
ANSI Class 600	14.9 MPa
ANSI Class 900	22.4 MPa
DIN PN 10	1.5 MPa
DIN PN 16	2.4 MPa
DIN PN 25	3.8 MPa
DIN PN 40	5.9 MPa

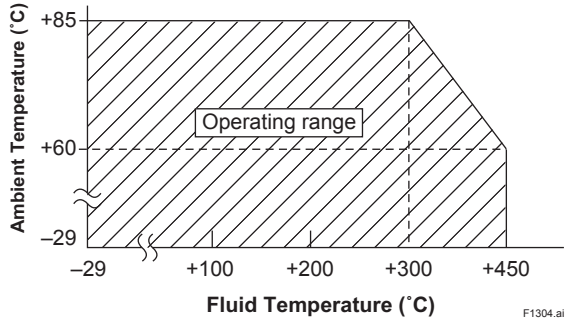


Figure 13.4 Fluid Temperature Range of High Process Temperature Version

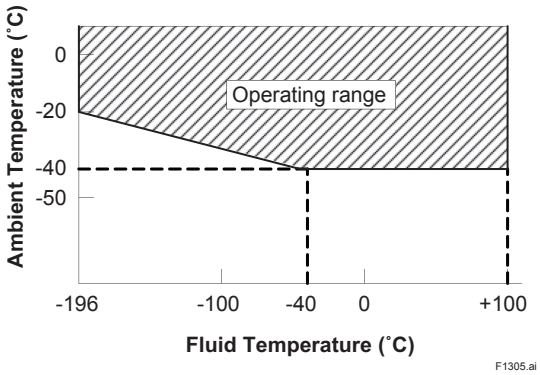


Figure 13.5 Fluid Temperature Range of Cryogenic Version

13.3.1 Option Multi-Variable (Built-In Temperature Sensor) Type (/MV)

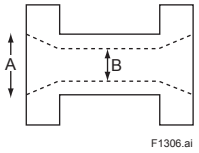
This options is the same as standard specification except the following items.

<table>
<tr><th colspan="8">Multi-Variable (Built-in Temperature sensor) Type (Option Code: /MV) (Note1)
High Process Temperature Version Multi-Variable Type (Option Code: /HT/MV)</th></tr>
<tr><td colspan="3">Model code</td><td colspan="5">DY025 to DY100 (Wafer)
DY025 to DY200 (Flange)</td></tr>
<tr><td colspan="3">Function (Note2)</td><td>Temperature Indication / Ouput</td><td colspan="4">Mass Flow Calculation
(Volmetric flowrate at Standard Condition for GAS)</td></tr>
<tr><td colspan="3">Fluid</td><td>LIQUID, GAS, SATURATED STEAM, SUPERHEATED STEAM (Note3)</td><td>SATURATED STEAM (Note4)</td><td>SUPERHEATED STEAM (Note5)</td><td>GAS (Note6)</td><td>LIQUID (Note7)</td></tr>
<tr><td rowspan="3">Mass Flow Calculation</td><td rowspan="2">Calculation Temperature Range</td><td>Option Code: /MV</td><td></td><td>+100 to +250°C</td><td>+100 to +250°C</td><td>-29 to +250°C</td><td>-29 to +250°C</td></tr>
<tr><td>Option Code: /HT/MV</td><td></td><td>+100 to +330°C</td><td>+100 to +400°C</td><td>-29 to +400°C</td><td>-29 to +400°C</td></tr>
<tr><td>Accuracy (Note8)</td><td>Option Code: /MV /HT/MV</td><td colspan="5">(Note8)</td></tr>
<tr><td rowspan="4">Temperature</td><td rowspan="2">Temperature Range</td><td>Option Code: /MV</td><td colspan="5">-29 to +250°C</td></tr>
<tr><td>Option Code: /HT/MV</td><td colspan="5">-29 to +400°C</td></tr>
<tr><td rowspan="2">Accuracy</td><td>Option Code: /MV</td><td></td><td colspan="2">±0.5°C(less than +100°C)
±0.5% of rate (+100°C or more)</td><td colspan="2">±1°C(less than +100°C)
±1% of rate (+100°C or more)</td></tr>
<tr><td>Option Code: /HT/MV</td><td></td><td colspan="4">±1°C (less than +100°C)
±1% of rate (+100°C or more)</td></tr>
<tr><td colspan="3">Temperature Response (50% Response)</td><td colspan="5">60 sec
(Churning Underwater)</td></tr>
<tr><td rowspan="4">Output</td><td colspan="2">Analog Output</td><td colspan="5">Select from Flow Rate or Temperature (Note9)</td></tr>
<tr><td colspan="2">Pulse Output</td><td colspan="5">Flow Rate: Same as Standard Type</td></tr>
<tr><td colspan="2">Alarm Output</td><td colspan="5">Alarm Output same as Standard Type and Temperature Sensor Error, etc.</td></tr>
<tr><td colspan="2">Status Output</td><td colspan="5">Flow Switch (Flow Rate): Same as Standard Type</td></tr>
<tr><td rowspan="2">Display</td><td colspan="2">Upper</td><td colspan="5">Select from Flow Rate (%, Engineering Unit) or Temperature (%) (Note10)</td></tr>
<tr><td colspan="2">Lower</td><td colspan="5">Select from Total Rate or Temperature (°C,°F) (Note11)</td></tr>
<tr><td colspan="3">Remote Type</td><td colspan="5">Select Vortex Flow Converter DYA-□□□/MV and Signal Cable DYC-□□□/MV (Note12)</td></tr>
</table>

(Note1) Multi-Variable Type /MV can not be combined with Cryogenic Version /LT.
(Note2) Temperature measurement may be affected by installation conditions, such as thermal insulation of piping or the temperature distribution of the fluid. Refer to Section 3.2 “Piping Precautions” for thermal insulation of piping. When measuring mass flow of saturated steam, superheated steam thermal insulation of piping may be required.
(Note3) Measured temperature is not used for flow measurement.
(Note4) Mass flow rate is calculated from density calculated with density at the mesuared temperature derived by the built-in saturated steam table.
(Note5) Mass flow rate is calculated with the density at the measured temperature derived by the built-in steam table. For mass flow calculation of superheated steam, operating pressure is used as constant value.
(Note6) Volumetric flow rate is calculated by temperature/pressure compensation. For volumetric flow calculation of gas, operating pressure and pressure at standard/normal condition are used.
(Note7) Mass flow rate is calculated with density compensated by the secondary formula of measured temperature. Operating density is used as a base density and the 1st and 2nd coefficients have to be set.
(Note8) Refer to Section 13.5 “Detailed Accuracy”
(Note9) The factory setting is the flow rate output. When the temperature output is required, it is necessary to change the parameter.
(Note10) In case of indicating the temperature %, the display indicate not only “%” but also “t”. (“t” means temperature).
(Note11) Default setting is “Temperature” but “Total” is set when the total rate is specified in sizing data.
(Note12) In case of remote type, option code /MV is necessary for both Vortex Flow Converter (DYA) and Signal Cable (DYC). To correct the temperature error due to signal cable length, parameter setting of the signal cable length to Vortex Flow Converter (DYA) is required.

13.3.2 Option Reduced Bore Type (/R1, /R2)

This option is the same as standard specification except the following items.

	Reduced Bore Type (Option: /R1, /R2) (Note1)				
(Note 2) 	Model Code	Flange piping size (A)	R1 Detector size (inner dia.) (B)	R2 Detector size (inner dia.) (B)	[Pressure Loss] R1: about 15% increases to standard type. R2: about 28% increases to standard type. Refer to Section 13.5 "Detailed Accuracy"
	DY025	25mm	15 (14.6) (mm) (Note 3)		
	DY040	40mm	25 (25.7) (mm)	15 (14.6) (mm) (Note 3)	
	DY050	50mm	40 (39.7) (mm)	25 (25.7) (mm)	
	DY080	80mm	50 (51.1) (mm)	40 (39.7) (mm)	
	DY100	100mm	80 (71) (mm)	50 (51.1) (mm)	
	DY150	150mm	100 (93.8) (mm)	80 (71) (mm)	
	DY200	200mm	150 (138.8) (mm)	100 (93.8) (mm)	
Measurable minimum flow velocity	Liquid, Gas, Steam			Refer to Table 13.5.	
Range of measurable flow velocity	Liquid, Gas, Steam			Refer to Table 13.6.	

(Note 1) For accuracy, refer to Section 13.5 "Detailed Accuracy". Cryogenic Version /LT is not available.
(Note 2) Flange type only: JIS10K, 20K (BJ1, BJ2) and ANSI150, 300 (BA1, BA2, BS1, BS2)
(Note 3) High process temperature version /HT and Multi-variable type /MV for DY025/R1 and DY040/R2 are not available.

13.4 Sizing

The following items are the basic specifications.
In case of the definite sizing, it is neccessary to check by the sizing software.

■ Measurable minimum flow velocity

Table 13.5 Relationship between Minimum Velocity and Density

Model Code			Liquid		Gas, Steam (Note1)	
Standard Type, Multi-Variable Type(/MV)	Reduced Bore Type (/R1) (Note2)	Reduced Bore Type (/R2) (Note2)	Standard Type, Cryogenic Version (/LT)(Note2), Multi-Variable Type (/MV) Unit: m/s	High Process Temperature Version(/HT), High Process Temperature Version Multi-Variable Type (/HT/MV) Unit: m/s	Standard Type, Cryogenic Version (/LT)(Note2), Multi-Variable Type (/MV) Unit: m/s	High Process Temperature Version(/HT), High Process Temperature Version Multi-Variable Type (/HT/MV) Unit: m/s
DY015	DY025/R1	DY040/R2	$\sqrt{250/\rho}$	—	$\sqrt{80/\rho}$ or 3	—
DY025	DY040/R1	DY050/R2	$\sqrt{122.5/\rho}$	$\sqrt{490/\rho}$	$\sqrt{45/\rho}$ or 2	$\sqrt{125/\rho}$ or 2
DY040	DY050/R1	DY080/R2	$\sqrt{90/\rho}$	$\sqrt{302.5/\rho}$	$\sqrt{31.3/\rho}$ or 2	$\sqrt{90.3/\rho}$ or 2
DY050	DY080/R1	DY100/R2	$\sqrt{90/\rho}$	$\sqrt{160/\rho}$	$\sqrt{31.3/\rho}$ or 2	$\sqrt{61.3/\rho}$ or 2
DY080	DY100/R1	DY150/R2	$\sqrt{90/\rho}$	$\sqrt{160/\rho}$	$\sqrt{31.3/\rho}$ or 2	$\sqrt{61.3/\rho}$ or 2
DY100	DY150/R1	DY200/R2	$\sqrt{90/\rho}$	$\sqrt{160/\rho}$	$\sqrt{31.3/\rho}$ or 2	$\sqrt{61.3/\rho}$ or 2
DY150	DY200/R1	—	$\sqrt{90/\rho}$	$\sqrt{160/\rho}$	$\sqrt{31.3/\rho}$ or 3	$\sqrt{61.3/\rho}$ or 3
DY200	—	—	$\sqrt{122.5/\rho}$	$\sqrt{202.5/\rho}$	$\sqrt{45/\rho}$ or 3	$\sqrt{80/\rho}$ or 3
DY250	—	—	$\sqrt{160/\rho}$	$\sqrt{360/\rho}$	$\sqrt{61.3/\rho}$ or 3	$\sqrt{125/\rho}$ or 3
DY300	—	—	$\sqrt{160/\rho}$	$\sqrt{360/\rho}$	$\sqrt{61.3/\rho}$ or 3	$\sqrt{125/\rho}$ or 3
DY400	—	—	$\sqrt{250/\rho}$	$\sqrt{490/\rho}$	$\sqrt{80/\rho}$ or 4	$\sqrt{125/\rho}$ or 4

ρ: Density at operating conditions (kg/m^3), Liquid density range is 400 to 2000 kg/cm^3
(Note1) The case of gas, it is whichever is greater than a fixed value of each model and calculated from density.
(Note2) Reduced bore type /R1 or /R2 are not available to combine for Cryogenic Version /LT.

■ Range of measurable flow velocity

Table 13.6 Range of measurable flow velocity

Fluid	Model Code			Minimum flow velocity	Maximum flow velocity
Liquid	DY015 to DY400	DY025 /R1 to DY200 /R1	DY040 /R2 to DY200 /R2	“flow velocity obtained from Table 13.5” or “flow velocity at Reynolds number of 5000”, whichever is greater. For liquid Reynolds number of 5000: Refer to Section 13.5 “Detailed Accuracy”.	10m/s
Gas, Steam	DY015 to DY400	DY025 /R1 to DY200 /R1	DY040 /R2 to DY200 /R2	“flow velocity obtained from Table 13.5” or “flow velocity at Reynolds number of 5000”, whichever is greater. For Gas and steam Reynolds number of 5000: Refer to Section 13.5 “Detailed Accuracy”.	80m/s

When the flow velocity is lower than minimum, both the analog output and the pulse output is displayed as “0”.

■ Range of fixed accuracy flow velocity

Table 13.7 Range of fixed accuracy flow velocity

Fluid	Model Code			Minimum flow velocity	Maximum flow velocity
Liquid	DY015 to DY100	DY025 /R1 to DY150 /R1	DY040 /R2 to DY200 /R2	“flow velocity obtained from Table 13.5” or “flow velocity at Reynolds number of 20000”, whichever is greater. For liquid Reynolds number of 20000: The value is four times velocity value in Section 13.5 “Detailed Accuracy”.	10m/s
	DY150 to DY400	DY200 /R1	—	“flow velocity obtained from Table 13.5” or “flow velocity at Reynolds number of 40000”, whichever is greater. For liquid Reynolds number of 40000: The value is eight times velocity value in Section 13.5 “Detailed Accuracy”.	
Gas, Steam	DY015 to DY100	DY025 /R1 to DY150 /R1	DY040 /R2 to DY200 /R2	“flow velocity obtained from Table 13.5” or “flow velocity at Reynolds number of 20000”, whichever is greater. For gas and steam Reynolds number of 20000: Refer to Section 13.5 “Detailed Accuracy”.	80m/s
	DY150 to DY400	DY200 /R1	—	“flow velocity obtained from Table 13.5” or “flow velocity at Reynolds number of 40000”, whichever is greater. For gas and steam Reynolds number of 40000: Refer to Section 13.5 “Detailed Accuracy”.	

13.5 Detailed Accuracy

Accuracy is the value in range of fixed accuracy flow velocity. Refer to Table 13.7.

Volumetric flow rate at operation condition

<table>
<tr><th></th><th>Model Code</th><th>Standard Type</th><th>Multi-Variable Type (/MV)</th><th>Reduced Bore Type (/R1)</th><th>Reduced Bore Type (/R2)</th></tr>
<tr><td rowspan="14">Liquid</td><td>DY015</td><td>±1.0%
(20000≤Re<2000*D)
±0.75%
(2000*D≤Re)</td><td></td><td></td><td></td></tr>
<tr><td>DY025</td><td>±1.0%
(20000≤Re<1500*D)
±0.75%
(1500*D≤Re)</td><td>±1.0%
(20000≤Re<1500*D)
±0.75%
(1500*D≤Re)</td><td rowspan="5">±1.0%</td><td></td></tr>
<tr><td>DY040</td><td rowspan="4">±1.0%
(20000≤Re<1000*D)
±0.75%
(1000*D≤Re)</td><td rowspan="4">±1.0%
(20000≤Re<1000*D)
±0.75%
(1000*D≤Re)</td><td rowspan="6">±1.0%</td></tr>
<tr><td>DY050</td></tr>
<tr><td>DY080</td></tr>
<tr><td>DY100</td></tr>
<tr><td>DY150</td><td rowspan="5">±1.0%
(40000≤Re<1000*D)
±0.75%
(1000*D≤Re)</td><td rowspan="2">±1.0%
(40000≤Re<1000*D)
±0.75%
(1000*D≤Re)</td></tr>
<tr><td>DY200</td><td>±1.0%
(40000≤Re)</td></tr>
<tr><td>DY250</td><td></td><td></td><td></td></tr>
<tr><td>DY300</td></tr>
<tr><td>DY400</td></tr>
<tr><td rowspan="14">Gas, Steam</td><td>DY015</td><td rowspan="14">±1.0%
(Velocity 35m/s or less)
±1.5%
(Velocity 35m/s to 80m/s)</td><td></td><td></td><td></td></tr>
<tr><td>DY025</td><td rowspan="9">±1.0%
(Velocity 35m/s or less)
±1.5%
(Velocity 35m/s to 80m/s)</td><td rowspan="9">±1.0%
(Velocity 35m/s or less)
±1.5%
(Velocity 35m/s to 80m/s)</td><td></td></tr>
<tr><td>DY040</td><td rowspan="9">±1.0%
(Velocity 35m/s or less)
±1.5%
(Velocity 35m/s to 80m/s)</td></tr>
<tr><td>DY050</td></tr>
<tr><td>DY080</td></tr>
<tr><td>DY100</td></tr>
<tr><td>DY150</td></tr>
<tr><td>DY200</td></tr>
<tr><td>DY250</td><td></td><td></td><td></td></tr>
<tr><td>DY300</td></tr>
<tr><td>DY400</td></tr>
</table>

D: Inner diameter of digitalYEWFLO (mm)
Re: Reynolds number (non unit)
Note: This table shows the accuracy of pulse output. In case of analog output, add up ± 0.1% of full scale to the values mentioned above.
Guarantee conditions of liquid volumetric flow rate: the accuracy of a product before shipment in our water actual test facility.
Totalized value of 2000 pulse or greater, straight pipe length: upper 10D or greater, lower 5D or greater, Fluid temp. 20 ± 10°C
Gas, Steam: The accuracy which is add up from liquid measurement accuracy.
The accuracy is confirmed by actual measured value of typical nominal size.

Mass flow or Volumetric flow rate at Normal/Standard condition:
for Multi-Variable Type and combination of Multi-Variable Type and Reduced Bore Type

<table>
<tr><th></th><th>Model Code</th><th>/MV</th><th>/MV/R1</th><th>/MV/R2</th></tr>
<tr><td rowspan="8">Liquid</td><td>DY025</td><td>±2.0% (20000≤Re<1500*D)
±1.5% (1500*D≤Re)</td><td></td><td></td></tr>
<tr><td>DY040</td><td rowspan="4">±2.0%(20000≤Re<1000*D)
±1.5% (1000*D≤Re)</td><td rowspan="5">±2.0% (20000≤Re)</td><td></td></tr>
<tr><td>DY050</td><td rowspan="5">±2.0% (20000≤Re)</td><td rowspan="6">±2.0% (20000≤Re)</td></tr>
<tr><td>DY080</td></tr>
<tr><td>DY100</td></tr>
<tr><td>DY150</td><td rowspan="2">±2.0% (40000≤Re<1000*D)
±1.5% (1000*D≤Re)</td></tr>
<tr><td>DY200</td><td>±2.0% (40000≤Re)</td></tr>
<tr><td rowspan="8">Gas,
Steam</td><td>DY025</td><td rowspan="8">±2.0%
(Velocity 35m/s or less)
±2.5%
(Velocity 35m/s to 80m/s)</td><td></td><td></td></tr>
<tr><td>DY040</td><td rowspan="7">±2.0%
(Velocity 35m/s or less)
±2.5%
(Velocity 35m/s to 80m/s)</td><td></td></tr>
<tr><td>DY050</td><td rowspan="7">±2.0%
(Velocity 35m/s or less)
±2.5%
(Velocity 35m/s to 80m/s)</td></tr>
<tr><td>DY080</td></tr>
<tr><td>DY100</td></tr>
<tr><td>DY150</td></tr>
<tr><td>DY200</td></tr>
</table>

D: Inner diameter of digitalYEWFLO (mm)
Re: Reynolds number (non unit)
Note: This table shows the accuracy of pulse output. In case of analog output, add up ± 0.1% of full scale to the values mentioned above.

for High Temperature Version Multi-Variable Type and combination of High Temperature Multi-Variable Type and Reduced Bore Type

<table>
<tr><th></th><th>Model Code</th><th>/HT/MV</th><th>/HT/MV/R1</th><th>/HT/MV/R2</th></tr>
<tr><td rowspan="8">Liquid</td><td>DY025</td><td>±2.0% (20000≤Re<1500*D)
±1.5% (1500*D≤Re)</td><td></td><td></td></tr>
<tr><td>DY040</td><td rowspan="4">±2.0%(20000≤Re<1000*D)
±1.5% (1000*D≤Re)</td><td rowspan="5">±2.0% (20000≤Re)</td><td></td></tr>
<tr><td>DY050</td><td rowspan="5">±2.0% (20000≤Re)</td><td rowspan="6">±2.0% (20000≤Re)</td></tr>
<tr><td>DY080</td></tr>
<tr><td>DY100</td></tr>
<tr><td>DY150</td><td rowspan="2">±2.0% (40000≤Re<1000*D)
±1.5% (1000*D≤Re)</td></tr>
<tr><td>DY200</td><td>±2.0% (40000≤Re)</td></tr>
<tr><td rowspan="8">Gas,
Superheated
Steam</td><td>DY025</td><td rowspan="8">±2.0%
(Velocity 35m/s or less)
±2.5%
(Velocity 35m/s to 80m/s)</td><td></td><td></td></tr>
<tr><td>DY040</td><td rowspan="7">±2.0%
(Velocity 35m/s or less)
±2.5%
(Velocity 35m/s to 80m/s)</td><td></td></tr>
<tr><td>DY050</td><td rowspan="7">±2.0%
(Velocity 35m/s or less)
±2.5%
(Velocity 35m/s to 80m/s)</td></tr>
<tr><td>DY080</td></tr>
<tr><td>DY100</td></tr>
<tr><td>DY150</td></tr>
<tr><td>DY200</td></tr>
<tr><td rowspan="8">Saturated
Steam</td><td>DY025</td><td rowspan="8">±3.0%
(Velocity 35m/s or less)
±3.5%
(Velocity 35m/s to 80m/s)</td><td></td><td></td></tr>
<tr><td>DY040</td><td rowspan="7">±3.0%
(Velocity 35m/s or less)
±3.5%
(Velocity 35m/s to 80m/s)</td><td></td></tr>
<tr><td>DY050</td><td rowspan="7">±3.0%
(Velocity 35m/s or less)
±3.5%
(Velocity 35m/s to 80m/s)</td></tr>
<tr><td>DY080</td></tr>
<tr><td>DY100</td></tr>
<tr><td>DY150</td></tr>
<tr><td>DY200</td></tr>
</table>

D: Inner diameter of digitalYEWFLO (mm)
Re: Reynolds number (non unit)
Note: This table shows the accuracy of pulse output. In case of analog output, add up ± 0.1% of full scale to the values mentioned above.

■ Calculation formula

■ How to calculate volume flow rate at operating conditions.

• $Q_f = 3600 \times \upsilon \times S$ or $Q_f = \frac{\upsilon \times D^2}{354}$

■ How to calculate the velocity of a Reynolds number.

• $\upsilon = 5 \times \nu / D$ (Reynolds number of 5000)
• $\upsilon = 20 \times \nu / D$ (Reynolds number of 20000)
• $\upsilon = 40 \times \nu / D$ (Reynolds number of 40000)

where

• $Re = \frac{354 \times 10^3 \times Q_f}{\nu \times D}$ ····· (1)

• $\nu = \frac{\mu}{\rho_f} \times 10^3$ ····· (2)

Q_f: Volume flow rate at operating conditions (m^3/h)
D: Inner diameter of digitalYEWFLO (mm)
S: Sectional area of digitalYEWFLO (m^2)
υ: Flow velocity (m/s)
Re: Reynolds number (non unit)
ρ_f: Density at operating conditions (kg/m^3)
μ: Viscosity at operating conditions (mPa·s (cP))
ν: Kinematic viscosity at operating conditions ($10^{-6}m^2/s$ (cSt))

■ Typical fluid example

Table 13.8 Range of Measurable Water Flow Rate
(At standard condition of 15°C, ρ = 1000 kg/m^3)

Model Code			Measurable Flow Rate in m^3/h	Range of Fixed Accuracy Flow Rate in m^3/h
DY015	DY025/R1	DY040/R2	0.30 to 6	0.94 to 6
DY025	DY040/R1	DY050/R2	0.65 to 18	1.7 to 18
DY040	DY050/R1	DY080/R2	1.3 to 44	2.6 to 44
DY050	DY080/R1	DY100/R2	2.2 to 73	3.3 to 73
DY080	DY100/R1	DY150/R2	4.3 to 142	4.6 to 142
DY100	DY150/R1	DY200/R2	7.5 to 248	7.5 to 248
DY150	DY200/R1	—	17 to 544	18 to 544
DY200	—	—	34 to 973	34 to 973
DY250	—	—	60 to 1506	60 to 1506
DY300	—	—	86 to 2156	86 to 2156
DY400	—	—	177 to 3547	177 to 3547

Table 13.9 Range of Measurable Air Flow Rate at Selected Process Pressures

Model Code			Flow Rate Limits	Minimum and Maximum Measurable Flow Rate in Nm^3/h									
				0 MPa	0.1 MPa	0.2 MPa	0.4 MPa	0.6 MPa	0.8 MPa	1 MPa	1.5 MPa	2 MPa	2.5 MPa
DY015	DY025 /R1	DY040 /R2	min.	4.8(11.1)	6.7(11.1)	8.2(11.1)	10.5(11.1)	12.5	16.1	19.7	28.6	37.5	46.4
			max.	48.2	95.8	143	239	334	429	524	762	1000	1238
DY025	DY040 /R1	DY050 /R2	min.	11.0(19.5)	15.5(19.5)	19.0(19.5)	24.5	29.0	33.3	40.6	59.0	77.5	95.9
			max.	149	297	444	739	1034	1329	1624	2361	3098	3836
DY040	DY050 /R1	DY080 /R2	min.	21.8(30.0)	30.8	37.8	48.7	61.6	79.2	97	149	184	229
			max.	356	708	1060	1764	2468	3171	3875	5634	7394	9153
DY050	DY080 /R1	DY100 /R2	min.	36.2(38.7)	51	62.4	80.5	102	131	161	233	306	379
			max.	591	1174	1757	2922	4088	5254	6420	9335	12249	15164
DY080	DY100 /R1	DY150 /R2	min.	70.1	98.4	120	155	197	254	310	451	591	732
			max.	1140	2266	3391	5642	7892	10143	12394	18021	23648	29274
DY100	DY150 /R1	DY200 /R2	min.	122	172	211	272	334	442	540	786	1031	1277
			max.	1990	3954	5919	9847	13775	17703	21632	31453	41274	51095
DY150	DY200 /R1	—	min.	268	377	485	808	1131	1453	1776	2583	3389	4196
			max.	4358	8659	12960	21559	30163	38765	47365	68867	90373	111875
DY200	—	—	min.	575	809	990	1445	2202	2599	3175	4617	6059	7501
			max.	7792	15482	23172	38549	53933	69313	84693	123138	161591	200046
DY250	—	—	min.	1037	1461	1788	2306	3127	4019	4911	7140	9370	11600
			max.	12049	23939	35833	59611	83400	107181	130968	190418	249881	309334
DY300	—	—	min.	1485	2093	2561	3303	4479	5756	7033	10226	13419	16612
			max.	17256	34286	51317	85370	119441	153499	187556	272699	357856	443017
DY400	—	—	min.	2790	3933	4812	7020	9821	12622	15422	22424	29426	36427
			max.	28378	56385	84391	140405	196418	252432	308445	448479	588513	728547

(1) Listed flow rate is at standard conditions STP (0°C. 1atm).
(2) Listed gauge pressure is at process temperature of 0°C.
(3) Maximum flow rate is the lower of 80m/s.
(4) Minimum flow rate: (value) is the lower limit of the accuracy range.

Table 13.10 Range of Measurable Saturated Steam Flow Rate at Selected Process Pressures

Model Code			Flow Rate Limits	Minimum and Maximum Measurable Flow Rate in kg/h									
				0.1 MPa	0.2 MPa	0.4 MPa	0.6 MPa	0.8 MPa	1 MPa	1.5 MPa	2 MPa	2.5 MPa	3 MPa
DY015	DY025 /R1	DY040 /R2	min.	5.8(10.7)	7.0(11.1)	8.8(11.6)	10.4(12.1)	11.6(12.3)	12.8	15.3	19.1	23.6	28.1
			max.	55.8	80	129	177	225	272	390	508	628	748
DY025	DY040 /R1	DY050 /R2	min.	13.4(18.9)	16.2(20.0)	20.5	24.1	27.1	30	36	41	49	58
			max.	169.7	247.7	400	548	696	843	1209	1575	1945	2318
DY040	DY050 /R1	DY080 /R2	min.	26.5(29.2)	32	40.6	47.7	53.8	59	72	93	116	138
			max.	405	591	954	1310	1662	2012	2884	3759	4640	5532
DY050	DY080 /R1	DY100 /R2	min.	44.0	53	67.3	79	89	98	119	156	192	229
			max.	671	979	1580	2170	2753	3333	4778	6228	7688	9166
DY080	DY100 /R1	DY150 /R2	min.	84.9	103	130	152	171	189	231	300	371	442
			max.	1295	1891	3050	4188	5314	6435	9224	12024	14842	17694
DY100	DY150 /R1	DY200 /R2	min.	148	179	227	267	300	330	402	524	647	772
			max.	2261	3300	5326	7310	9276	11232	16102	20986	25907	30883
DY150	DY200 /R1	—	min.	324	392	498	600	761	922	1322	1723	2127	2536
			max.	4950	7226	11661	16010	20315	24595	35258	45953	56729	67624
DY200	—	—	min.	697	841	1068	1252	1410	1649	2364	3081	3803	4534
			max.	8851	12918	20850	28627	36325	43976	63043	82165	101433	120913
DY250	—	—	min.	1256	1518	1929	2260	2546	2801	3655	4764	5882	7011
			max.	13687	19977	32243	44268	56172	68005	97489	127058	156854	186978
DY300	—	—	min.	1799	2174	2762	3236	3646	4012	5235	6823	8423	10041
			max.	19602	28609	46175	63397	80445	97390	139614	181960	224633	267772
DY400	—	—	min.	3381	4086	5187	6078	6848	8002	11472	14957	18468	22003
			max.	32217	47070	75834	104152	132193	160037	229449	299131	369366	440055

(1) Maximum flow rate is the lower of 80m/s.
(2) Minimum values are determined from Table 13.7. The values in parenthesis show the minimum linear flow rates (Re = 20,000 or 40,000) when they are higher than the minimum measurable flow rate.

■ Reference

Table 13.11 Inner Diameter and Nominal value

Model Code			Inner Diameter mm	Nominal K-Factor Pulse/L	Nominal Pulse Rate	
					Hz / m/s	Hz / m³/h
DY015	DY025 /R1	DY040 /R2	14.6	376	62.7	104
DY025	DY040 /R1	DY050 /R2	25.7	68.6	35.5	19.1
DY040	DY050 /R1	DY080 /R2	39.7	18.7	23.1	5.19
DY050	DY080 /R1	DY100 /R2	51.1	8.95	18.3	2.49
DY080	DY100 /R1	DY150 /R2	71.0	3.33	13.2	0.925
DY100	DY150 /R1	DY200 /R2	93.8	1.43	9.88	0.397
DY150	DY200 /R1	—	138.8	0.441	6.67	0.123
DY200	—	—	185.6	0.185	5.00	0.0514
DY250	—	—	230.8	0.0966	4.04	0.0268
DY300	—	—	276.2	0.0563	3.37	0.0156
DY400	—	—	354.2	0.0265	2.61	0.00736

■ Pressure Loss

Calculation of pressure loss for standard type

obtained from the following equations.

$\Delta P = 108 \times 10^{-5} \times \rho_f \times \upsilon^2$ ····· (1)

or

$\Delta P = 135 \times \rho_f \times \frac{Q_f^2}{D^4}$ ····· (2)

where,

ΔP: Pressure loss (kPa)
ρ_f: Density at operating condition (kg/m³)
υ: Flow velocity (m/s)
Q_f: Actual flow rate (m³/h)
D: Inner diameter of digitalYEWFLO (mm)

(Example)

DY050, hot water: 80°C, flowrate: 30 m³/h

1. Since the density of water at 80°C is 972 kg/m³, substitute this value in equation (2):

$\Delta P = 135 \times 972 \times 30^2 / 51.1^4$
$= 17.3$ kPa

2. Obtain the pressure loss using equation (1). The flow velocity when the flow rate is 30 m³/h is given by:

$\upsilon = 354 \times Q_f / D^2 = \frac{354 \times 30}{51.1^2} = 4.07$m/s

Therefore, substitute this value in equation (1):

$\Delta P = 108 \times 10^{-5} \times 972 \times 4.07^2$
$= 17.3$ kPa

Calculation of pressure loss for reduced bore type (Option code: /R1)

obtained from the following equations.

$\Delta P = 124 \times 10^{-5} \times \rho_f \times \upsilon^2$ ····· (3)

or

$\Delta P = 155 \times \rho_f \times Q_f^2 / D^4$ ····· (4)

(Example)

DY040/R1, hot water: 50 °C, flowrate: 10 m³/h

1. Since the density of water at 50 °C is 992 kg/m³, substitute this value in equation (4):

$\Delta P = 155 \times 992 \times 10^2 / 25.7^4$
$= 35.3$ kPa

2. Obtain by using equation (3). The flow velocity when the flow rate is 10 m³/h is given by:

$\upsilon = 354 \times Q_f \times / D^2 = 354 \times 10 \times 25.7^2$
$= 5.4$m/s

Therefore, substitute this value in equation (3):

$\Delta P = 124 \times 10^{-5} \times 992 \times 5.4^2$
$= 35.3$ kPa

Calculation of pressure loss for reduced bore type (Option code: /R2)

obtained from the following equations.

$\Delta P = 138 \times 10^{-5} \times \rho_f \times \upsilon^2$ ····· (5)

or

$\Delta P = 173 \times \rho_f \times \frac{Q_f^2}{D^4}$ ····· (6)

(Example)

DY050-/R2, hot water: 50 °C, flowrate: 15 m³/h

1. Since the density of water at 50 °C is 992 kg/m³, substitute this value in equation (6):

$\Delta P = 173 \times 992 \times 15^2 / 25.7^4$
$= 88.5$ kPa

2. Obtain by using equation (5). The flow velocity when the flow rate is 15m³/h is given by:

$\upsilon = 354 \times Q_f / D^2 = \frac{354 \times 15}{25.7^2} = 8.0$m/s

Therefore, substitute this value in equation (5):

$\Delta P = 138 \times 10^{-5} \times 992 \times 8.0^2$
$= 88.5$ kPa

■ Cavitation

(Minimum Back Pressure, Liquid service only):

Cavitation occurs when the flow line pressure is low and flow velocity is high during fluid measurement, preventing correct measurement of flow rate. The optimum line pressure can be obtained from the following equation.

$P = 2.7 \times \Delta P + 1.3 \times Po$ ····· (7)

Where,

P: Line pressure, 2 to 7 times as large as internal diameter on downstream of flowmeter body surface. (kPa absolute).

ΔP: Pressure loss (kPa). Refer to the item above.

Po: Saturation liquid vapor pressure at operating temperature (kPa absolute).

(Example) Confirmation of presence of cavitation Suppose that the line pressure is 120 kPa abs and the flow rate scale is 0 to 30 m^3/h. It is only necessary to confirm the pressure at the maximum flow rate ; therefore, the saturated steam pressure of water at 80°C is as follows from the table of saturated steam pressures:

Po = 47.4 kPa abs

Therefore, substitute this value in equation (7):

$P = 2.7 \times 17.3 + 1.3 \times 47.4$

$= 108.3$ kPa abs

Since the operating pressure of 120 kPa abs is higher than 108.3 kPa abs, no cavitation occurs.

13.6 Option Specifications (For Explosion Protected Type)

* Refer to “Contact rating” for the maximum current value of Pulse Circuit.

Item	Specification	Code
TIIS Certification	**TIIS Flameproof Approval** (Note 1) Flameproof Ex d IIC T6 Certified by TIIS. (TIIS is the abbreviation of Technology Institution of Industrial Safety.) Amb. Temp: –20 to 60°C Electrical connection: JIS G1/2 female	**JF3**
Factory Mutual (FM)	**FM Explosion proof Approval** Applicable Standard: FM3600, FM3611, FM3615, FM3810, ANSI/NEMA 250 Type of Protection: Explosion proof for Class I, Division 1, Groups A, B, C and D; Dust-ignitionproof Class II/III, Division 1, Groups E, F, and G. “SEAL ALL CONDUITS WITHIN 18 INCHES.” “WHEN INSTALLED IN DIV.2, SEALS NOT REQUIRED.” Enclosure Rating: Type 4X Temperature Code: T6 Ambient Temperature: –29 to 60°C (Integral Type Vortex Flowmeter and Remote Type Vortex Flow Detector) –40 to 60°C (Remote Type Vortex Flow Converter) Ambient Humidity: 0 to100%RH (No condensation) Coating of Enclosure: Epoxy resin coating or Polyurethane resin coating. Electrical Connection: ANSI 1/2NPT female	**FF1**
	FM Intrinsically safe Approval (Note 2) Applicable Standard: FM3600, FM3610, FM3611, FM3810, NEMA-250, ANSI/ISA-60079-0, ANSI/ISA 60079-11 Type of Protection: Intrinsically safe: Class I, Division 1, Groups A, B, C and D, T4 Class II, Division 1, Groups E, F and G, T4 Class III, Division 1, T4 Class I, Zone 0, AEx ia IIC T4 Nonincendive: Class I, Division 2, Groups A, B, C and D, T4 Class II, Division 2, Groups F and G, T4 Class III, Division 1, T4 Ambient Temperature: –29 to +60°C (Integral Type Vortex Flowmeter) –29 to +80°C (Remote Type Vortex Flow Detector) –40 to +60°C (Remote Type Vortex Flow Converter) Ambient Humidity: 0 to 100% RH (No condensation) Indoors and Outdoors: Type 4X Electrical Parameter: Vmax=30Vdc, Imax=165mAdc, Pi=0.9W, Ci=12nF, Li=0.15mH Electrical Connection: ANSI 1/2NPT female	**FS1**
ATEX	**ATEX Flameproof Approval** (Note 3) Applicable Standard: EN 60079-0, EN 60079-1 Type of Protection: II2 G Ex d IIC T6...1 Gb (Integral Type Vortex Flowmeter and Remote Type Vortex Flow Detector) II2 G Ex d IIC T6 Gb (Remote Type Vortex Flow Converter) Groups: II, Category: 2 G Temperature Class: T6...T1 (Integral Type Vortex Flowmeter and Remote Type Vortex Flow Detector) T6 (Remote Type Vortex Flow Converter) Process Temp.: T6 (-29 to 80°C), T5 (-29 to 100°C), T4 (-29 to 135°C), T3 (–29 to 200°C), T2 (–29 to 300°C) T1 (–29 to 450°C) (Use /HT version above 250°C), Ambient temperature: –29 to 60°C (Integral Type Vortex Flowmeter and Remote Type Vortex Flow Detector) –40 to 60°C (Remote Type Vortex Flow Converter without indicator) –30 to 60°C (Remote Type Vortex Flow Converter with indicator) Ambient Humidity: 0 to 100%RH (No condensation) Electrical Connection: ANSI 1/2NPT female, ISO M20 × 1.5 female	KF2
	ATEX Intrinsically Sare (Note 2) Applicable Standard: EN 60079-0, EN 60079-11, EN 60079-26 Type of protection: Ex ia IIC T4...T1Ga (Integral Type Vortex Flowmeter) Ex ia IIC T6...T1 Ga (Remote Type Vortex Flow Detector) Ex ia IIC T4 Ga (Remote Type Vortex Flow Converter) Groups/Category: II 1 G Temperature Class: T4...T1(Integral Type Vortex Flowmeter) T6...T1(Remote Type Vortex Flow Detector) T4 (Remote Type Vortex Flow Converter) Ambient temperature: –29 to +60°C (Integral Type Vortex Flowmeter) –40 to +80[79]°C (Remote Type Vortex Flow Detector) (Option /LT below –29°C, [ ] for Option /MV at T6) –40 to +80°C (Remote Type Vortex Flow Converter without indicator): –30 to +80°C (Remote Type Vortex Flow Converter with indicator): Ambient Humidity: 5 to 100%RH (No condensation) Process temperature: T6: –196 to 84[79]°C, T5: –196 to 100°C, T4: –196 to 135°C, T3: –196 to 199°C, T2: –196 to 299[289]°C, T1: –196 to 449[439]°C (Option /HT above 250°C and Option /LT below -29°C, [ ] : Option /MV) Signal/Supply (Terminals SUPPLY + and –) and Pulse (Terminals PULSE + and –) Circuit: Ui = 30 V, Ii = 300 mA, Pi = 0.9 W (linear source), Ci = 14 nF, Li = 0 mH Electrical connection: ANSI 1/2 NPT female, ISO M20 × 1.5 female	KS2

(Note 1) The flameproof packing adapter /G11 or /G12 is necessary except the electrical conduit work. In case the ambient temperature exceeds 50°C, use heat resistant cables with maximum allowable temperature of 70°C or above.
(Note 2) For intrinsically safe approval, use the barrier certified by the testing laboratories (BARD-400 is not applicable).
(Note 3) Cryogenic Version /LT is not available.

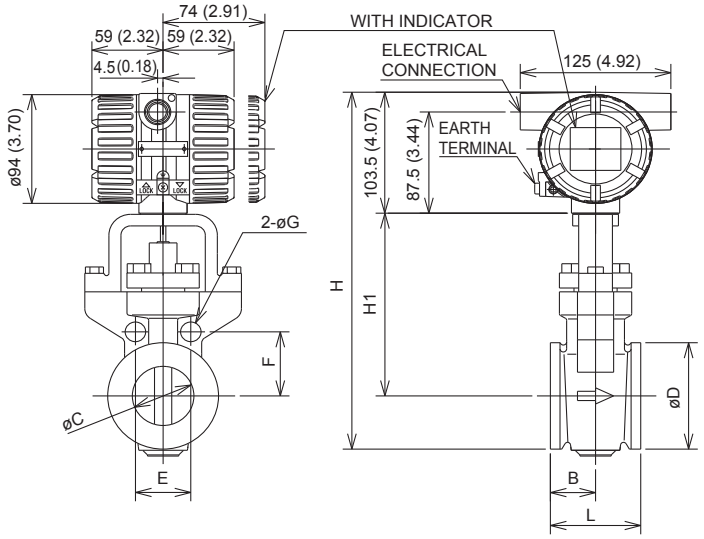
Item	Specification	Code
Canadian Standards Association (CSA)	**CSA Explosion proof Approval** Applicable Standard: C22.1-98, C22.2 No.0, C22.2 No.0.4, C22.2 No.0.5, C22.2 No.25, C22.2 No.30, C22.2 No.94, C22.2 No.142, C22.2, No.61010-1, ANSI/ISA-12.27.01 Type of Protection: explosion-proof for Class I, Groups B, C and D; Class II, Groups E, F, and G; Class III. For Class I, Division 2 locations- "FACTORY SEALED, CONDUIT SEAL NOT REQUIRD" Temperature Class: T6...T1 (Integral Type Vortex Flowmeter and Remote Type Vortex Flow Detector) T6 (Remote Type Vortex Flow Converter) Amb.Temp.: –29 to +60°C (Integral Type Vortex Flowmeter and Remote Type Vortex Flow Detector) –40 to +60°C (Remote Type Vortex Flow Converter) Process temp.: T6;85°C, T5;100°C, T4;135°C, T3;200°C, T2;300°C, T1; 450°C Enclosure: Type 4X Coating of Enclosure: Epoxy resin coating or Polyurethane resin coating. Electrical Connection: ANSI 1/2 NPT female (Special)	CF1
	CSA Explosion proof Approval · The approval specification is the same with /CF1. · Process Sealing Certification Dual Seal Certified by CSA to the requirement of ANSI/ISA 12.27.01 No additional sealing required	CF11
	CSA Intrinsically safe Approval (Note 2) Applicable Standard: C22.2 No. 0.4, C22.2 No. 157, C22.2 No. 213, C22.2 No. 1010.1, CAN/CSA-E60079-0, CAN/CSA-E60079-11, CAN/CSA-E60079-15 and ANSI/ISA 12.27.01 Type of Protection: Ex ia IIC T4...T1 and Ex nC IIC T4...T1 (Integral Type Flowmeter and Remote Type Flowmeter) Ex ia IIC T4 and Ex nC IIC T4 (Remote Type Converter) Process Temp.: T4;135°C, T3;200°C, T2;300°C, T1;450°C (Integral Type Vortex Flowmeter and Remote Type Vortex Flow Detector) Amb. Temp.: –40 to +60°C (Integral Type Vortex Flowmeter, Remote Type Vortex Flow Detector and Remote Type Vortex Flow Converter) Amb. Hum.: 0 to 100%RH (No condensation) Degree of Protection of Enclosure: IP67 Electrical Parameter: Ui=30Vdc, Ii=165mAdc, Pi=0.9W, Ci=12nF, Li=0.15mH. Electrical Connection: ANSI 1/2 NPT female Type of Protection: Intrinsically Safe for Class I, II, III, DIV.1, Groups A, B, C, D, E, F and G Non-incendive for Class I, II, DIV.2, Groups A, B, C, D, E, F and G, ClassIII, DIV.1. Temperature Code: T4...T1(Integral Type Vortex Flowmeter and Remote Type Vortex Flow Detector) T4(Remote Type Vortex Flow Converter) Process Temp.: T4;135°C, T3; 200°C, T2; 300°C, T1; 450°C (Integral Type Vortex Flowmeter and Remote Type Vortex Flow Detector) Amb. Temp.: –40 to +60°C (Integral Type Vortex Flowmeter, Remote Type Vortex Flow Detector and Remote Type Vortex Flow Converter) Amb. Hum.: 0 to 100%RH (No condensation) Enclosure: Type 4X Electrical Parameter: Vmax =30Vdc, I max =165mAdc, Pmax = 0.9W, Ci =12nF, Li = 0.15mH. Electrical Connection: ANSI 1/2 NPT female	CS1
	CSA Intrinsically safe Approval · The approval specification is the same with /CS1. · Process Sealing Certification Dual Seal Certified by CSA to the requirement of ANSI/ISA 12.27.01 No additional sealing required	CS11
IECEx	**IECEx Flameproof Approval** (Note 1) Applicable Standard: IEC 60079-0, IEC 60079-1 Type of Protection: Ex d IIC T6...T1 Gb (Integral Type Vortex Flowmeter and Remote Type Vortex Flow Detector) Ex d IIC T6 Gb (Remote Type Vortex Flow Converter) Temperature Class: T6...T1 (Integral Type Vortex Flowmeter and Remote Type Vortex Flow Detector) T6 (Remote Type Vortex Flow Converter) Process Temp.: T6(–29 to 80°C), T5(–29 to 100°C), T4(–29 to 135°C), T3(–29 to 200°C), T2(–29 to 300°C), T1(–29 to 450°C) (Use /HT version above 250°C) Ambient temperature: –29 to 60°C (Integral Type Vortex Flowmeter and Remote Type Vortex Flow Detector) –40 to 60°C (Remote Type Vortex Flow Converter without indicator) –30 to 80°C (Remote Type Vortex Flow Converter with indicator) Ambient Humidity: 0 to 100%RH Electrical Connection: ANSI 1/2NPT female, ISO M20 × 1.5 female	SF2
	IECEx Intrinsically Safe (Note 2) Applicable Standard: IEC 60079-0, IEC 60079-11, IEC 60079-26 Type of protection: Ex ia IIC T4...T1Ga (Integral Type Vortex Flowmeter) Ex ia IIC T6...T1 Ga (Remote Type Vortex Flow Detector) Ex ia IIC T4 Ga (Remote Type Vortex Flow Converter) Temperature Class: T4...T1(Integral Type Vortex Flowmeter) T6...T1(Remote Type Vortex Flow Detector) T4 (Remote Type Vortex Flow Converter) Ambient temperature: –29 to +60°C (Integral Type Vortex Flowmeter) –40 to +80[79]°C (Remote Type Vortex Flow Detector) (Option /LT below –29°C, [ ] for Option /MV at T6) –40 to +80°C (Remote Type Vortex Flow Converter without indicator): –30 to +80°C (Remote Type Vortex Flow Converter with indicator): Ambient Humidity: 5 to 100%RH (No condensation) Process temperature: T6: –196 to 84[79]°C, T5: –196 to 100°C, T4: –196 to 135°C, T3: –196 to 199°C, T2: –196 to 299[289]°C, T1: –196 to 449[439]°C (Option /HT above 250°C and Option /LT below –29°C, [ ] : Option /MV) Signal/Supply (Terminals SUPPLY + and –) and Pulse (Terminals PULSE + and –) Circuit: Ui = 30 V, Ii = 300 mA, Pi = 0.9 W (linear source), Ci = 14 nF, Li = 0 mH Electrical connection: ANSI 1/2 NPT female, ISO M20 × 1.5 female	SS2

(Note 1) Cryogenic Version /LT is not available.
(Note 2) For intrinsically safe approval, use the barrier certified by the testing laboratories (BARD-400 is not applicable).

13.7 External Dimensions

■ Wafer type (DY015 to DY100)

Unit : mm
(approx. inch)



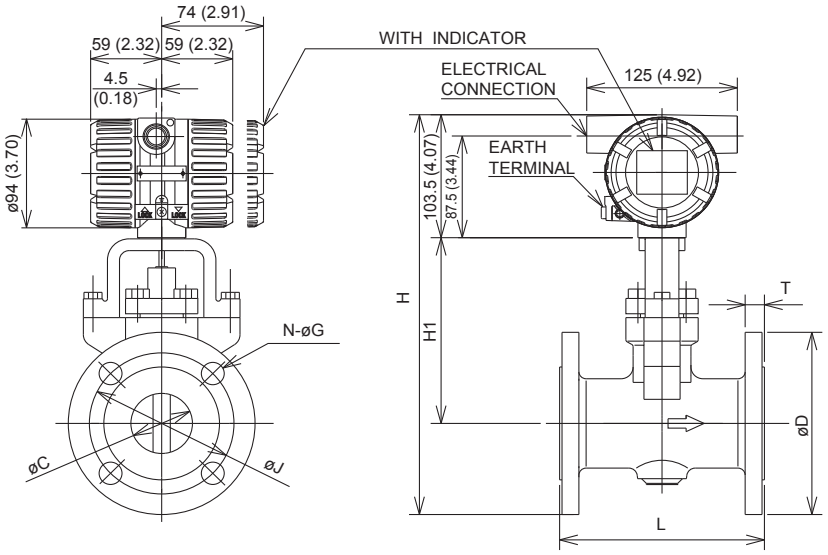
TYPE	INTEGRAL/REMOTE																				
MODEL CODE	DY015							DY025							DY040						
PROCESS CONNECTION	AJ1	AJ2	AJ4	AA1	AA2	AA4	AD1 to AD4	AJ1	AJ2	AJ4	AA1	AA2	AA4	AD1 to AD4	AJ1	AJ2	AJ4	AA1	AA2	AA4	AD1 to AD4
L	70 (2.76)							70 (2.76)							70 (2.76)						
B	35 (1.38)							35 (1.38)							35 (1.38)						
C	14.6 (0.57)							25.7 (1.01)							39.7 (1.56)						
D	35.1 (1.38)							50.8 (2.00)							73 (2.87)						
H	248 (9.76)							258 (10.16)							276 (10.87)						
H1	127 (5.00)							129 (5.08)							136 (5.35)						
E	49.5 (1.95)	49.5 (1.95)	56.6 (2.23)	42.7 (1.68)	47.1 (1.85)	47.1 (1.85)	46 (1.81)	63.6 (2.50)	63.6 (2.50)	67.2 (2.65)	56 (2.21)	62.9 (2.48)	62.9 (2.48)	60.1 (2.37)	74.2 (2.92)	74.2 (2.92)	84.9 (3.34)	69.7 (2.74)	80.8 (3.18)	80.8 (3.18)	77.8 (3.06)
F	24.7 (0.97)	24.7 (0.97)	28.3 (1.11)	21.4 (0.84)	23.5 (0.93)	23.5 (0.93)	23 (0.91)	31.8 (1.25)	31.8 (1.25)	33.6 (1.32)	28 (1.10)	31.4 (1.24)	31.4 (1.24)	30.1 (1.19)	37.1 (1.46)	37.1 (1.46)	42.4 (1.67)	34.8 (1.37)	40.4 (1.59)	40.4 (1.59)	38.9 (1.53)
G	13 (0.51)	13 (0.51)	17 (0.67)	14 (0.55)	14 (0.55)	14 (0.55)	13 (0.51)	17 (0.67)	17 (0.67)	17 (0.67)	14 (0.55)	17 (0.67)	17 (0.67)	13 (0.51)	17 (0.67)	17 (0.67)	21 (0.83)	14 (0.55)	20 (0.79)	20 (0.79)	17 (0.67)
WEIGHT kg (lb)	2.8 (6.2)							3.7 (8.2)							4.3 (9.5)						

TYPE	INTEGRAL/REMOTE																						
MODEL CODE	DY050							DY080								DY100							
PROCESS CONNECTION	AJ1	AJ2	AJ4	AA1	AA2	AA4	AD1 to AD4	AJ1	AJ2	AJ4	AA1	AA2	AA4	AD1 AD2	AD3 AD4	AJ1	AJ2	AJ4	AA1	AA2	AA4	AD1 AD2	AD3 AD4
L	75 (2.95)							100 (3.94)								120 (4.72)							
B	37.5 (1.48)							40 (1.57)								50 (1.97)							
C	51.1 (2.01)							71 (2.80)								93.8 (3.69)							
D	92 (3.62)							127 (5.00)								157.2 (6.19)							
H	307.5 (12.11)							342 (13.47)								372 (14.65)							
H1	158 (6.22)							175 (6.89)								190 (7.48)							
E	(Note 3)	45.9 (1.81)	49.8 (1.96)	(Note 3)	48.6 (1.91)	48.6 (1.91)	(Note 3)	57.4 (2.26)	61.2 (2.41)	65.1 (2.56)	(Note 3)	64.4 (2.54)	64.4 (2.54)	61.2 (2.41)	61.2 (2.41)	67 (2.64)	70.8 (2.79)	78.5 (3.09)	72.9 (2.87)	76.6 (3.02)	82.6 (3.25)	68.9 (2.71)	72.7 (2.86)
F	(Note 3)	55.4 (2.18)	60.1 (2.36)	(Note 3)	58.7 (2.31)	58.7 (2.31)	(Note 3)	69.3 (2.73)	73.9 (2.91)	78.5 (3.09)	(Note 3)	77.7 (3.06)	77.7 (3.06)	73.9 (2.91)	73.9 (2.91)	80.8 (3.18)	85.5 (3.37)	94.7 (3.73)	88 (3.46)	92.5 (3.64)	99.7 (3.93)	83.1 (3.27)	87.8 (3.46)
G	(Note 3)	17 (0.67)	17 (0.67)	(Note 3)	17 (0.67)	17 (0.67)	(Note 3)	17 (0.67)	21 (0.83)	21 (0.83)	(Note 3)	20 (0.79)	20 (0.79)	17 (0.67)	17 (0.67)	17 (0.67)	21 (0.83)	23 (0.91)	17 (0.67)	20 (3.06)	23 (0.91)	17 (0.67)	21 (0.83)
WEIGHT kg (lb)	6.0 (13.2)							9.4 (20.7)								12.8 (28.2)							

(Note 1) Integral weight is the same as Remote.
(Note 2) In case of with Indicator, add 0.2kg.
(Note 3) The holes are not provided.
(Note 4) The flow direction is opposite (right to left when facing onto indicator) in case of code/CRC.

■ Flange type (DY015 to DY100)

Unit : mm
(approx. inch)



TYPE	INTEGRAL/REMOTE																				
MODEL CODE	DY015										DY025										
PROCESS CONNECTION	BJ1	BJ2	BJ4	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1 to BD4	CA4	CA5	BJ1	BJ2	BJ4	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1 to BD4	CA4	CA5
L	130 (5.12)						160 (6.30)	130 (5.12)	140 (5.51)	160 (6.30)	150 (5.91)						190 (7.48)	150 (5.91)	170 (6.69)	190 (7.48)	
C	14.6 (0.58)										25.7 (1.01)										
D	95 (3.74)	95 (3.74)	115 (4.53)	88.9 (3.50)	95.3 (3.75)	95.3 (3.75)	120.7 (4.75)	95 (3.74)	95.3 (3.75)	120.7 (4.75)	125 (4.92)	125 (4.92)	130 (5.12)	108 (4.25)	124 (4.88)	124 (4.88)	149.4 (5.88)	115 (4.53)	124 (4.88)	149.4 (5.88)	
H	278 (10.94)	278 (10.94)	288 (11.34)	275 (10.83)	278 (10.94)	278 (10.94)	291 (11.46)	278 (10.94)	278 (10.94)	291 (11.46)	295 (11.61)	295 (11.61)	297.5 (11.91)	286.5 (11.28)	294.5 (11.59)	294.5 (11.59)	307 (12.09)	290 (11.42)	294.5 (11.59)	307 (12.09)	
H1	127 (5.00)										129 (5.08)										
T	12 (0.47)	14 (0.55)	20 (0.79)	11.2 (0.44)	14.2 (0.56)	21 (0.83)	28.8 (1.13)	16 (0.63)	19.9 (0.78)	28.8 (1.13)	14 (0.55)	16 (0.63)	22 (0.87)	14.2 (0.56)	17.5 (0.69)	24 (0.94)	34.9 (1.37)	18 (0.71)	24 (0.94)	34.9 (1.37)	
J	70 (2.76)	70 (2.76)	80 (7.15)	60.5 (2.38)	66.5 (2.62)	66.5 (2.62)	82.6 (3.25)	65 (2.56)	66.5 (2.62)	82.6 (3.25)	90 (3.54)	90 (3.54)	95 (3.74)	79.2 (3.12)	89 (3.50)	89 (3.50)	101.6 (4.00)	85 (3.35)	89 (3.50)	101.6 (4.00)	
N	4										4										
G	15 (0.59)	15 (0.59)	19 (0.75)	15.7 (0.62)	15.7 (0.62)	15.7 (0.62)	22.4 (0.88)	14 (0.55)	15.7 (0.62)	22.4 (0.88)	19 (0.75)	19 (0.75)	19 (0.75)	15.7 (0.62)	19 (0.75)	19 (0.75)	25.4 (1.00)	14 (0.55)	19 (0.75)	25.4 (1.00)	
WEIGHT kg (lb)	4.2 (9.26)	4.3 (9.48)	5.9 (13.01)	4.1 (9.04)	4.3 (9.48)	4.6 (10.14)	6.7 (14.77)	4.2 (9.26)	4.5 (9.92)	6.8 (14.99)	6.9 (15.21)	7.1 (15.66)	8.6 (18.96)	6.6 (14.55)	7.2 (15.88)	7.7 (16.98)	11.1 (24.48)	6.9 (15.21)	7.9 (17.42)	11.4 (25.14)	

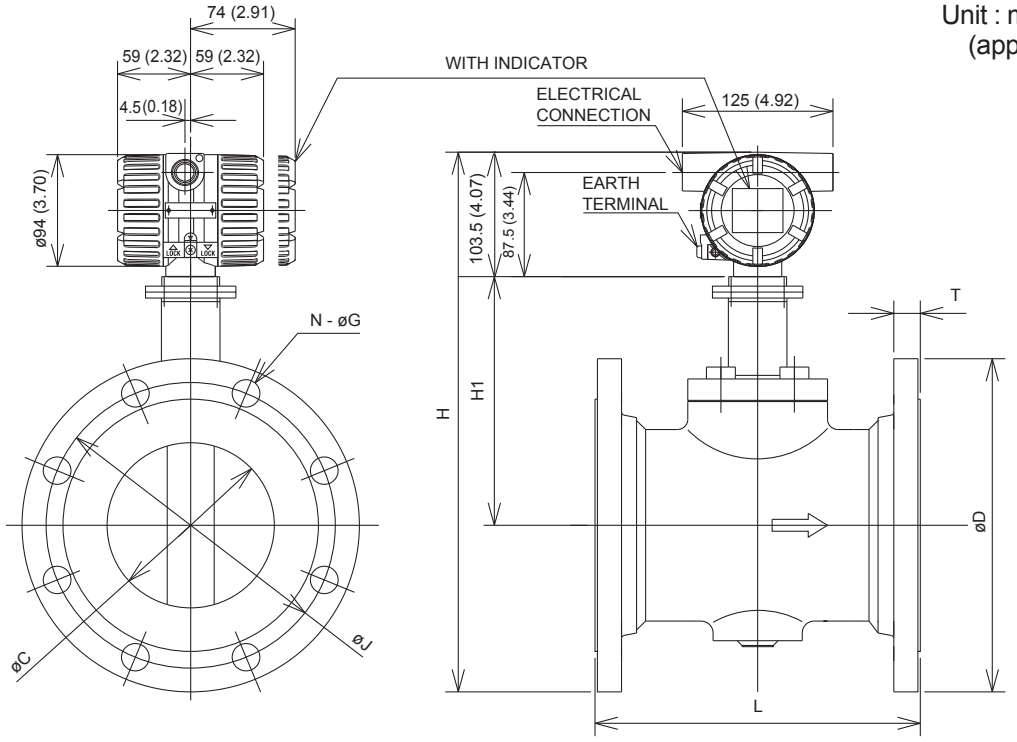
TYPE	INTEGRAL/REMOTE																				
MODEL CODE	DY040										DY050										
PROCESS CONNECTION	BJ1	BJ2	BJ4	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1 to BD4	CA4	CA5	BJ1	BJ2	BJ4	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1 to BD4	CA4	CA5	
L	150 (5.91)						200 (7.87)	150 (5.91)	185 (7.28)	200 (7.87)	170 (6.69)						230 (9.06)	170 (6.69)	205 (8.07)	230 (9.06)	
C	39.7 (1.56)										51.1 (2.01)										
D	140 (5.51)	140 (5.51)	160 (6.30)	127 (5.00)	155.4 (6.12)	155.4 (6.12)	177.8 (7.00)	150 (5.91)	155.4 (6.12)	177.8 (7.00)	155 (6.10)	155 (6.10)	165 (6.50)	152.4 (6.00)	165.1 (6.50)	165.1 (6.50)	215.9 (8.50)	165 (6.50)	165.1 (6.50)	215.9 (8.50)	
H	309.5 (12.19)	309.5 (12.19)	319.5 (12.58)	303 (11.93)	317 (12.48)	317 (12.48)	328.5 (12.93)	314.5 (12.38)	317 (12.48)	328.5 (12.93)	339 (13.35)	339 (13.35)	344 (13.54)	337.5 (13.29)	344 (13.54)	344 (13.54)	369.5 (14.55)	344 (13.54)	344 (13.54)	369.5 (14.55)	
H1	136 (5.35)										158 (6.22)										
T	16 (0.63)	18 (0.71)	26 (1.02)	17.5 (0.69)	20.6 (0.81)	28.8 (1.13)	38.2 (1.50)	18 (0.71)	28.8 (1.13)	38.2 (1.50)	16 (0.63)	18 (0.71)	26 (1.02)	19.1 (0.75)	22.4 (0.88)	31.8 (1.25)	44.5 (1.75)	20 (0.79)	33.3 (1.31)	46 (1.81)	
J	105 (4.13)	105 (4.13)	120 (4.72)	98.6 (3.88)	114.3 (4.50)	114.3 (4.50)	124 (4.88)	110 (4.33)	114.3 (4.50)	124 (4.88)	120 (4.72)	120 (4.72)	130 (5.12)	120.7 (4.75)	127 (5.00)	127 (5.00)	165.1 (6.50)	125 (4.92)	127 (5.00)	165.1 (6.50)	
N	4										4	8	8	4	8	8	8	4	8	8	
G	19 (0.75)	19 (0.75)	23 (0.91)	15.7 (0.62)	22.4 (0.88)	22.4 (0.88)	28.4 (1.12)	18 (0.71)	22.4 (0.88)	28.4 (1.12)	19 (0.75)	19 (0.75)	19 (0.75)	19 (0.75)	19 (0.75)	19 (0.75)	25.4 (1.00)	18 (0.71)	19 (0.75)	25.4 (1.00)	
WEIGHT kg (lb)	8.2 (18.08)	8.4 (18.52)	11.9 (26.24)	8.1 (17.86)	9.3 (20.51)	11.3 (24.92)	16.2 (35.72)	8.8 (19.4)	11.7 (25.8)	16.3 (35.94)	11.1 (24.48)	11.6 (25.58)	14.3 (31.53)	11.7 (25.8)	13.2 (29.11)	14.8 (32.63)	26.5 (58.43)	11.3 (24.92)	15.8 (34.84)	26.9 (59.31)	

TYPE	INTEGRAL/REMOTE																					
MODEL CODE	DY080											DY100										
PROCESS CONNECTION	BJ1	BJ2	BJ4	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1 BD2	BD3 BD4	CA4	CA5	BJ1	BJ2	BJ4	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1 BD2	BD3 BD4	CA4	CA5
L	200 (7.87)						245 (9.65)	200 (7.87)		235 (9.25)	250 (9.84)	220 (8.66)					240 (9.45)	280 (11.02)	220 (8.66)		270 (10.63)	285 (11.22)
C	71 (2.80)											93.8 (3.69)										
D	185 (7.28)	200 (7.87)	210 (8.27)	190.5 (7.50)	209.6 (8.25)	209.6 (8.25)	241.3 (9.50)	200 (7.87)	200 (7.87)	209.6 (8.25)	241.3 (9.50)	210 (8.27)	225 (8.90)	250 (9.84)	228.6 (9.00)	254 (10.00)	273 (10.75)	292.1 (11.50)	220 (8.66)	235 (9.25)	273 (10.75)	292.1 (11.50)
H	371 (14.61)	378.5 (14.90)	383.5 (15.10)	374 (14.72)	383.5 (15.10)	383.5 (15.10)	399 (15.71)	378.5 (14.90)	378.5 (14.90)	383.5 (15.10)	399 (15.71)	398.5 (15.69)	406 (15.98)	418.5 (16.48)	409 (16.10)	420.5 (16.56)	430 (16.93)	439.5 (17.30)	403.5 (15.89)	411 (16.18)	430 (16.93)	439.5 (17.30)
H1	175 (6.89)											190 (7.48)										
T	18 (0.71)	22 (0.87)	32 (1.26)	23.9 (0.94)	28.4 (1.12)	38.2 (1.50)	44.5 (1.75)	20 (0.79)	24 (0.95)	39.7 (1.56)	46 (1.81)	18 (0.71)	24 (0.95)	36 (1.42)	23.9 (0.94)	31.8 (1.25)	44.5 (1.75)	50.9 (2.00)	20 (0.79)	24 (0.95)	46 (1.81)	52.4 (2.06)
J	150 (5.91)	160 (6.30)	170 (6.69)	152.4 (6.00)	168.2 (6.62)	168 (6.61)	190.5 (7.50)	160 (6.30)	160 (6.30)	170 (6.69)	180 (7.09)	175 (6.89)	185 (7.28)	205 (8.07)	190.5 (7.50)	200.2 (7.88)	216 (8.50)	235 (9.25)	180 (7.09)	190 (7.48)	216 (8.50)	235 (9.25)
N	8	8	8	4	8	8	8	8	8	8	8	8										
G	19 (0.75)	23 (0.91)	23 (0.91)	19 (0.75)	22.4 (0.88)	22.4 (0.88)	25.4 (1.00)	18 (0.71)	18 (0.71)	22.4 (0.88)	25.4 (1.00)	19 (0.75)	23 (0.91)	25 (0.98)	19 (0.75)	22.4 (0.88)	25.4 (1.00)	31.8 (1.25)	18 (0.71)	22 (0.87)	25.4 (1.00)	31.8 (1.25)
WEIGHT kg (lb)	17.4 (38.37)	20 (44.1)	25.4 (56.01)	20 (44.1)	23.8 (52.48)	25.4 (56.01)	35.7 (78.72)	19.4 (42.78)	20 (44.1)	27.1 (59.76)	36.3 (80.04)	22.8 (50.27)	26.8 (59.09)	38.1 (84.01)	27.4 (60.42)	35.9 (79.16)	50.8 (112.01)	55.9 (123.26)	23.2 (51.16)	27.4 (60.42)	52.8 (116.42)	56.6 (124.8)

(Note 1) Integral weight is the same as Remote.
(Note 2) In case of with Indicator, add 0.2kg.
(Note 3) The flow direction is opposite (right to left when facing onto indicator) in case of code/CRC.

■ Flange type (DY150 to DY400)

Unit : mm
(approx. inch)



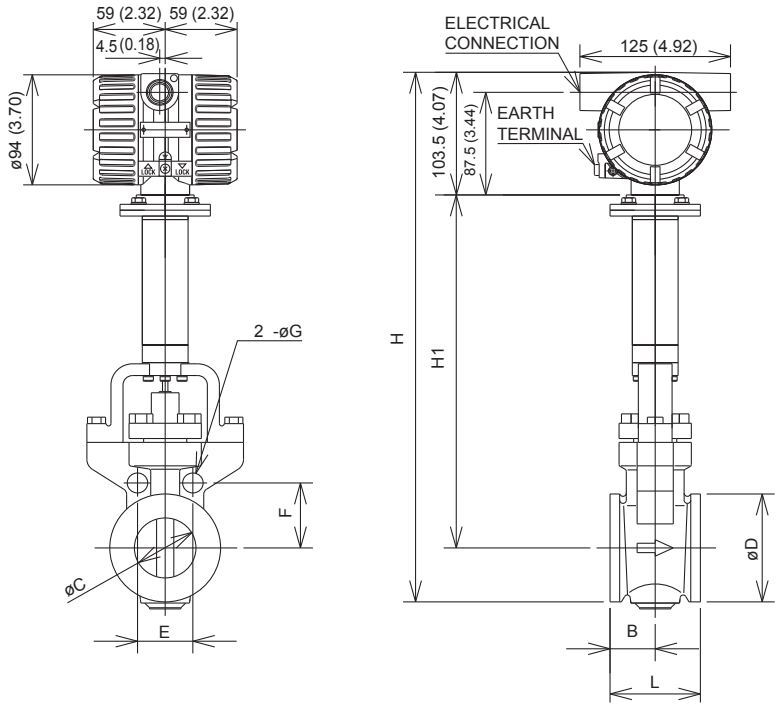
TYPE		INTEGRAL/REMOTE																							
MODEL CODE		DY150											DY200												
PROCESS CONNECTION		BJ1	BJ2	BJ4	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1 BD2	BD3 BD4	CA4	CA5	BJ1	BJ2	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1	BD2	BD3	BD4	CA4	CA5
L		270 (10.63)					310 (12.21)	336 (13.23)	270 (10.63)		325 (12.80)	340 (13.39)	310 (12.20)				370 (14.57)	386 (15.20)	310 (12.20)				375 (14.77)	390 (15.55)
C		138.8 (5.46)											185.6 (7.31)											
D		280 (11.02)	305 (12.01)	355 (13.98)	279.4 (11.00)	317.5 (12.50)	356 (14.02)	381 (15.00)	285 (11.22)	300 (11.81)	356 (14.02)	381 (15.00)	330 (12.99)	350 (13.78)	342.9 (13.50)	381 (15.00)	419.1 (16.50)	469.9 (18.50)	340 (13.39)	340 (13.39)	360 (14.17)	375 (14.76)	419.1 (16.50)	469.9 (18.50)
H	Shedder Bar Material: L, E, X	453 (17.83)	465 (18.31)	490 (19.29)	452 (17.80)	471 (18.54)	491 (19.33)	503 (19.80)	455 (17.91)	463 (18.23)	491 (19.33)	503 (19.80)	510 (20.08)	520 (20.47)	516 (20.31)	535 (21.06)	554 (21.81)	579 (22.80)	515 (20.28)	515 (20.28)	525 (20.67)	532 (20.94)	554 (21.81)	579 (22.80)
	Shedder Bar Material: B	460 (18.11)	472 (18.58)	497 (19.57)	459 (18.67)	478 (18.82)	498 (19.61)	510 (20.08)	462 (18.19)	470 (18.50)	498 (19.61)	510 (20.08)	517 (20.35)	527 (20.75)	523 (20.59)	542 (21.34)	561 (22.09)	586 (23.07)	522 (20.55)	522 (20.55)	532 (20.94)	539 (21.22)	561 (22.09)	586 (23.07)
H1	Shedder Bar Material: L, E, X	209 (8.23)											241 (9.49)											
	Shedder Bar Material: B	216 (8.50)											248 (9.76)											
T		22 (0.87)	28 (1.10)	44 (1.73)	25.4 (1.00)	36.6 (1.44)	54.4 (2.14)	62 (2.44)	16 (0.63)	16 (0.63)	19.9 (0.78)	28.8 (1.13)	22 (0.87)	30 (1.18)	28.4 (1.12)	41.1 (1.62)	62 (2.44)	69.9 (2.75)	24 (0.95)	24 (0.95)	30 (1.18)	34 (1.34)	63.6 (2.50)	71.4 (2.81)
J		240 (9.45)	260 (10.24)	295 (11.61)	241.3 (9.50)	269.7 (10.62)	292 (11.50)	317.5 (12.50)	65 (2.56)	65 (2.56)	66.5 (2.62)	82.6 (3.25)	290 (11.42)	305 (12.01)	298.5 (11.75)	330.2 (13.00)	349.3 (13.75)	393.7 (15.50)	295 (11.61)	295 (11.61)	310 (12.20)	320 (12.60)	349.3 (13.75)	393.7 (15.50)
N		8	12	12	8	12	12	12	8	8	12	12	12	12	8	12	12	12	8	12	12	12	12	12
G		23 (0.91)	25 (0.98)	33 (1.30)	22.4 (0.88)	22.4 (0.88)	28.4 (1.12)	31.8 (1.25)	22 (0.87)	26 (1.02)	28.4 (1.12)	31.8 (1.25)	23 (0.91)	22.4 (0.88)	25 (0.98)	25.4 (1.00)	31.8 (1.25)	38.1 (1.50)	22 (0.87)	22 (0.87)	26 (1.02)	30 (1.18)	31.8 (1.25)	38.1 (1.50)
WEIGHT kg (lb)		33.4 (73.65)	43.4 (95.7)	76.4 (168.46)	36.4 (80.26)	54.4 (119.95)	84.4 (186.10)	106 (233.73)	33.4 (73.65)	42.9 (94.59)	90 (198.45)	107 (235.94)	45.4 (100.11)	52.4 (115.54)	55.4 (122.16)	80.4 (177.28)	136 (299.88)	182 (401.31)	46.3 (102.09)	46.3 (102.09)	53.6 (118.19)	55.9 (123.26)	139 (306.52)	183 (403.52)

TYPE	INTEGRAL/REMOTE											
MODEL CODE	DY250				DY300				DY400			
PROCESS CONNECTION	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2
L	370 (14.57)				400 (15.75)				520 (20.47)			
C	230.8 (9.09)				276.2 (10.87)				354.2 (13.94)			
D	400 (15.75)	140 (5.51)	406.4 (16.00)	444.5 (17.50)	445 (17.52)	480 (18.90)	482.6 (19.00)	520.7 (20.50)	560 (22.05)	605 (23.82)	596.9 (23.5)	647.7 (25.5)
H	581 (22.87)	309.5 (12.19)	584 (22.99)	603 (23.74)	633 (24.92)	651 (25.63)	652 (25.67)	671 (26.42)	757.5 (29.82)	780 (30.71)	776 (30.55)	801 (31.54)
H1	277 (10.91)				307 (12.09)				374 (14.72)			
T	24 (0.94)	34 (1.34)	30.2 (1.19)	47.8 (1.88)	24 (0.94)	36 (1.42)	31.8 (1.25)	50.8 (2.00)	28 (1.10)	46 (1.81)	36.6 (1.44)	57.2 (2.25)
J	355 (13.98)	380 (14.96)	362 (14.25)	387.4 (15.25)	400 (15.75)	430 (16.93)	431.8 (17.00)	450.9 (17.75)	510 (20.08)	540 (21.26)	539.8 (21.25)	571.5 (22.5)
N	12	12	12	16	16	16	12	16	16	16	16	20
G	25 (0.98)	27 (1.06)	25.4 (1.00)	28.5 (1.12)	25 (0.98)	27 (1.06)	25.4 (1.00)	31.8 (1.25)	27 (1.06)	33 (1.30)	28.5 (1.12)	35.1 (1.38)
WEIGHT kg (lb)	78 (171.99)	100 (220.5)	90 (198.45)	125 (275.63)	100 (220.5)	128 (282.24)	140 (308.7)	178 (392.49)	265 (584.2)	308 (679)	300 (661.4)	370 (815.7)

(Note 1) Integral weight is the same as Remote.
(Note 2) In case of with Indicator, add 0.2kg.
(Note 3) The flow direction is opposite (right to left when facing onto indicator) in case of code/CRC.

■ High Process Temperature Version (/HT): DY025/HT to DY100/HT
■ Cryogenic Version (/LT): DY015/LT to DY100/LT
■ Wafer type

Unit : mm
(approx. inch)



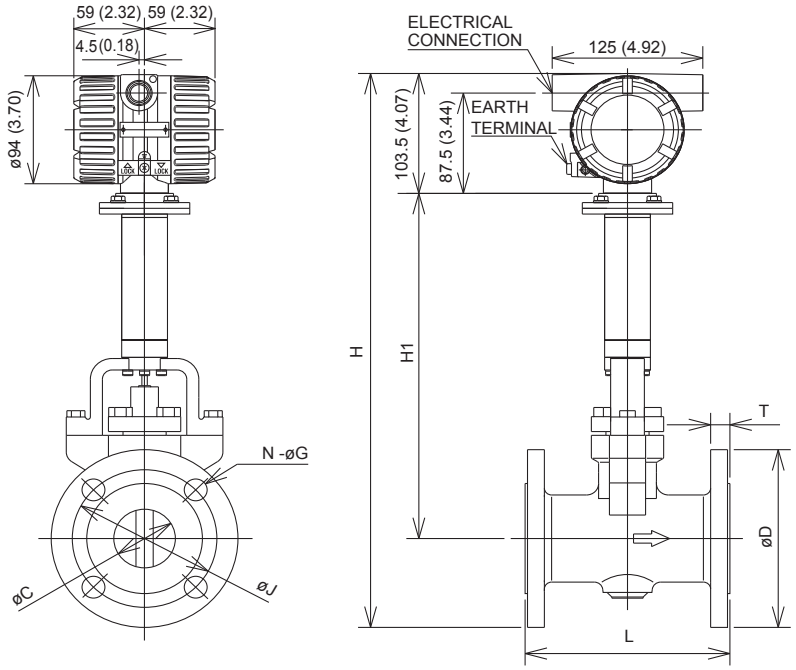
TYPE	REMOTE																						
MODEL CODE	DY015/LT							DY025/LT, DY025/HT							DY040/LT, DY040/HT								
PROCESS CONNECTION	AJ1	AJ2	AJ4	AA1	AA2	AA4	AD1 to AD4	AJ1	AJ2	AJ4	AA1	AA2	AA4	AD1 to AD4	AJ1	AJ2	AJ4	AA1	AA2	AA4	AD1 to AD4		
L	70 (2.76)							70 (2.76)							70 (2.76)								
B	35 (1.38)							35 (1.38)							35 (1.38)								
C	14.6 (0.57)							25.7 (1.01)							39.7 (1.56)								
D	35.1 (1.38)							50.8 (2.00)							73 (2.87)								
H	391 (15.39)							401 (15.79)							419 (16.50)								
H1	270 (10.63)							272 (10.71)							279 (10.98)								
E	49.5 (1.95)	49.5 (1.95)	56.6 (2.23)	42.7 (1.68)	47.1 (1.85)	47.1 (1.85)	46 (1.81)	63.6 (2.50)	63.6 (2.50)	67.2 (2.65)	56 (2.20)	62.9 (2.48)	62.9 (2.48)	60.1 (2.37)	74.2 (2.92)	74.2 (2.92)	84.9 (3.34)	69.7 (2.74)	80.8 (3.18)	80.8 (3.18)	77.8 (3.06)		
F	24.7 (0.97)	24.7 (0.97)	28.3 (1.11)	21.4 (0.84)	23.5 (0.93)	23.5 (0.93)	23 (0.91)	31.8 (1.25)	31.8 (1.25)	33.6 (1.32)	28 (1.10)	31.4 (1.24)	31.4 (1.24)	30.1 (1.19)	37.1 (1.46)	37.1 (1.46)	42.4 (1.67)	34.8 (1.37)	40.4 (1.59)	40.4 (1.59)	38.9 (1.53)		
G	13 (0.51)	13 (0.51)	17 (0.67)	14 (0.55)	14 (0.55)	14 (0.55)	13 (0.51)	17 (0.67)	17 (0.67)	17 (0.67)	14 (0.55)	17 (0.67)	17 (0.67)	13 (0.51)	17 (0.67)	17 (0.67)	21 (0.83)	14 (0.55)	20 (0.79)	20 (0.79)	17 (0.67)		
WEIGHT kg (lb)	3.2 (7.06)							4.1 (9.04)							4.7 (10.36)								

TYPE	REMOTE																						
MODEL CODE	DY050/LT, DY050/HT							DY080/LT, DY080/HT								DY100/LT, DY100/HT							
PROCESS CONNECTION	AJ1	AJ2	AJ4	AA1	AA2	AA4	AD1 to AD4	AJ1	AJ2	AJ4	AA1	AA2	AA4	AD1 AD2	AD3 AD4	AJ1	AJ2	AJ4	AP1 AA1	AP2 AA2	AP4 AA4	AD1 AD2	AD3 AD4
L	75 (2.95)							100 (3.94)								120 (4.72)							
B	37.5 (1.48)							40 (1.57)								50 (1.97)							
C	51.1 (2.01)							71 (2.80)								93.8 (3.69)							
D	92 (3.62)							127 (5.00)								157.2 (6.19)							
H	450.5 (17.74)							485 (19.09)								515 (20.28)							
H1	301 (11.85)							318 (12.52)								333 (13.11)							
E	(Note 1)	45.9 (1.81)	49.8 (1.96)	(Note 1)	48.6 (1.91)	48.6 (1.91)	(Note 1)	57.4 (2.26)	61.2 (2.41)	65.1 (2.56)	(Note 1)	64.4 (2.54)	64.4 (2.54)	61.2 (2.41)	61.2 (2.41)	67 (2.64)	70.8 (2.79)	78.5 (3.09)	72.9 (2.87)	76.6 (3.02)	82.6 (3.25)	68.9 (2.71)	72.7 (2.86)
F	(Note 1)	55.4 (2.18)	60.1 (2.37)	(Note 1)	58.7 (2.31)	58.7 (2.31)	(Note 1)	69.3 (2.73)	73.9 (2.91)	78.5 (3.09)	(Note 1)	77.7 (3.06)	77.7 (3.06)	73.9 (2.91)	73.9 (2.91)	80.8 (3.18)	85.5 (3.37)	94.7 (3.73)	88 (3.46)	92.5 (3.64)	99.7 (3.93)	83.1 (3.27)	87.8 (3.46)
G	(Note 1)	17 (0.67)	17 (0.67)	(Note 1)	17 (0.67)	17 (0.67)	(Note 1)	17 (0.67)	21 (0.83)	21 (0.83)	(Note 1)	20 (0.79)	20 (0.79)	17 (0.67)	17 (0.67)	17 (0.67)	21 (0.83)	23 (0.91)	17 (0.67)	20 (0.79)	23 (0.91)	17 (0.67)	21 (0.83)
WEIGHT kg (lb)	6.4 (14.11)							9.8 (21.61)								13.2 (29.11)							

(Note 1) The holes are not provided.
(Note 2) The flow direction is opposite (right to left when facing onto indicator) in case of code/CRC.

■ High Process Temperature Version (/HT): DY025/HT to DY100/HT
■ Cryogenic Version (/LT): DY015/LT to DY100/LT
■ Flange type

Unit : mm
(approx. inch)



TYPE	REMOTE																			
MODEL CODE	DY015/LT										DY025/LT, DY025/HT									
PROCESS CONNECTION	BJ1	BJ2	BJ4	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1 to BD4	CA4	CA5	BJ1	BJ2	BJ4	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1 to BD4	CA4	CA5
L	130 (5.12)						160 (6.30)	130 (5.12)	140 (5.51)	160 (6.30)	150 (5.91)						190 (7.48)	150 (5.91)	170 (6.69)	190 (7.48)
C	14.6 (0.57)										25.7 (1.01)									
D	95 (3.74)	95 (3.74)	115 (4.53)	88.9 (3.50)	95.3 (3.75)	95.3 (3.75)	120.7 (4.75)	95 (3.74)	95.3 (3.75)	120.7 (4.75)	125 (4.92)	125 (4.92)	130 (5.12)	108 (4.25)	124 (4.88)	124 (4.88)	149.4 (5.88)	115 (4.53)	124 (4.88)	149.4 (5.88)
H	421 (16.57)	421 (16.57)	431 (16.97)	418 (16.46)	421 (16.57)	421 (16.57)	434 (17.09)	421 (16.57)	421 (16.57)	434 (17.09)	438 (17.24)	438 (17.24)	441 (17.36)	430 (16.93)	438 (17.24)	438 (17.24)	450 (17.72)	433 (17.05)	438 (17.24)	450 (17.18)
H1	270 (10.63)										272 (10.71)									
T	12 (0.47)	14 (0.55)	20 (0.79)	11.2 (0.44)	14.2 (0.56)	21 (0.83)	28.8 (1.13)	16 (0.63)	19.9 (0.78)	28.8 (1.13)	14 (0.55)	16 (0.63)	22 (0.87)	14.2 (0.56)	17.5 (0.69)	24 (0.94)	34.9 (1.37)	18 (0.71)	24 (0.94)	34.9 (1.37)
J	70 (2.76)	70 (2.76)	80 (3.15)	60.5 (2.38)	66.5 (2.62)	66.5 (2.62)	82.6 (2.25)	65 (2.56)	66.5 (2.62)	82.6 (2.25)	90 (3.54)	90 (3.54)	95 (3.74)	79.2 (3.12)	89 (3.50)	89 (3.50)	101.6 (4.00)	85 (3.35)	89 (3.50)	101.6 (4.00)
N	4										4									
G	15 (0.59)	15 (0.59)	19 (0.75)	15.7 (0.62)	15.7 (0.62)	15.7 (0.62)	22.4 (0.88)	14 (0.55)	15.7 (0.62)	22.4 (0.88)	19 (0.75)	19 (0.75)	19 (0.75)	15.7 (0.62)	19 (0.75)	19 (0.75)	25.4 (1.00)	14 (0.55)	19 (0.75)	25.4 (1.00)
WEIGHT kg (lb)	4.6 (10.14)	4.7 (10.36)	6.3 (13.89)	4.5 (9.92)	4.7 (10.36)	5 (11.03)	7.1 (15.66)	4.6 (10.14)	4.9 (10.8)	7.2 (15.88)	7.3 (16.1)	7.5 (16.54)	9 (19.85)	7 (15.44)	7.6 (16.76)	8.1 (17.86)	11.5 (25.36)	7.3 (16.1)	8.3 (18.3)	11.8 (26.02)

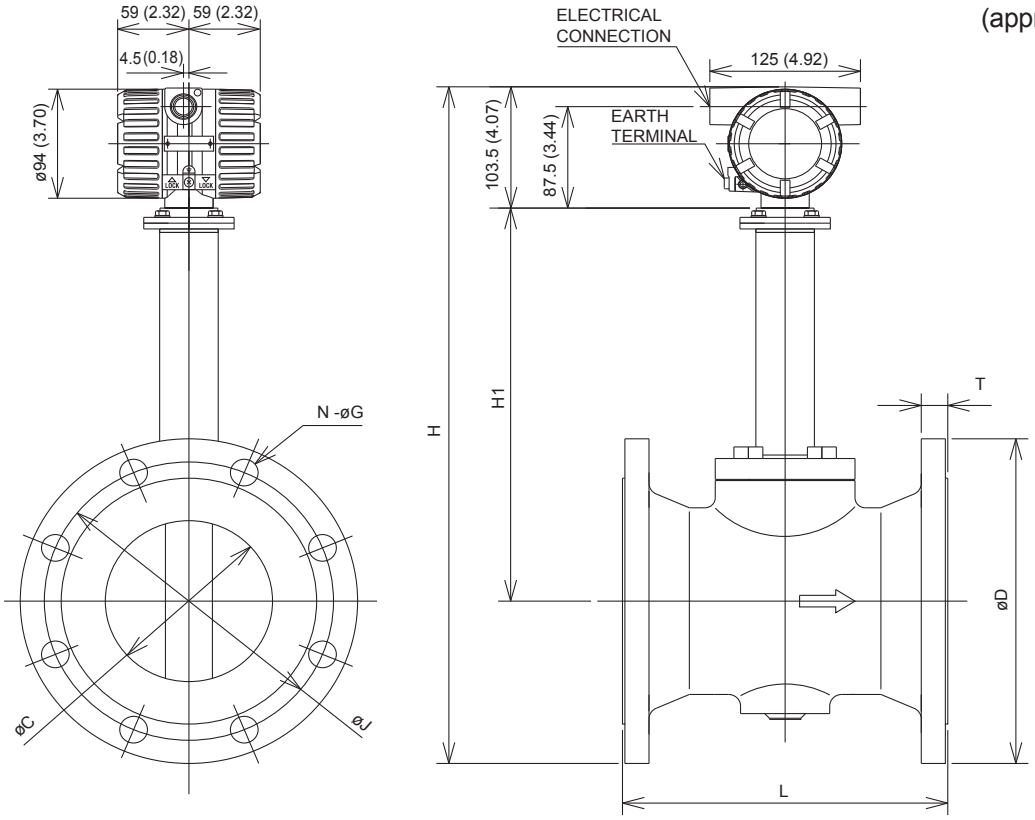
TYPE	REMOTE																			
MODEL CODE	DY040/LT, DY040/HT										DY050/LT, DY050/HT									
PROCESS CONNECTION	BJ1	BJ2	BJ4	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1 to BD4	CA4	CA5	BJ1	BJ2	BJ4	BA1 BS1	BA2 BP2	BA4 BS4	BA5 BS5	BD1 to BD4	CA4	CA5
L	150 (5.91)						200 (7.87)	150 (5.91)	185 (7.28)	200 (7.87)	170 (6.69)						230 (9.06)	170 (6.69)	205 (8.07)	230 (9.06)
C	39.7 (1.56)										51.1 (2.01)									
D	140 (5.51)	140 (5.51)	160 (6.30)	127 (5.00)	155.4 (6.12)	155.4 (6.12)	177.8 (7.00)	150 (5.91)	155.4 (6.12)	177.8 (7.00)	155 (6.10)	155 (6.10)	165 (6.50)	152.4 (6.00)	165.1 (6.50)	165.1 (6.50)	215.9 (8.50)	165 (6.50)	165.1 (6.50)	215.9 (8.50)
H	453 (17.83)	453 (17.83)	463 (18.23)	446 (17.56)	460 (18.11)	460 (18.11)	472 (18.58)	458 (18.03)	460 (18.11)	472 (18.58)	482 (18.98)	482 (18.98)	487 (19.17)	481 (18.94)	487 (19.17)	487 (19.17)	513 (20.20)	487 (19.17)	487 (19.17)	513 (20.20)
H1	279 (10.98)										301 (11.85)									
T	16 (0.63)	18 (0.71)	26 (1.02)	17.5 (0.69)	20.6 (0.81)	28.8 (1.13)	38.2 (1.50)	18 (0.71)	28.8 (1.13)	38.2 (1.50)	16 (0.63)	18 (0.71)	26 (1.02)	19.1 (0.75)	22.4 (0.88)	31.8 (1.25)	44.5 (1.75)	20 (0.79)	33.3 (1.31)	46 (1.81)
J	105 (4.13)	105 (4.13)	120 (4.72)	98.6 (3.88)	114.3 (4.50)	114.3 (4.50)	124 (4.88)	110 (4.33)	114.3 (4.50)	124 (4.88)	120 (4.72)	120 (4.72)	130 (5.12)	120.7 (4.75)	127 (5.00)	127 (5.00)	165.1 (6.50)	125 (4.92)	127 (5.00)	165.1 (6.50)
N	4										4	8	8	4	8	8	8	4	8	8
G	19 (0.75)	19 (0.75)	23 (0.91)	15.7 (0.62)	22.4 (0.88)	22.4 (0.88)	28.4 (1.12)	18 (0.71)	22.4 (0.88)	28.4 (1.12)	19 (0.75)	19 (0.75)	19 (0.75)	19 (0.75)	19 (0.75)	19 (0.75)	25.4 (1.00)	18 (0.71)	19 (0.75)	25.4 (1.00)
WEIGHT kg (lb)	8.6 (18.96)	8.8 (19.4)	12.3 (27.12)	8.5 (18.74)	9.7 (21.39)	11.7 (25.8)	16.6 (36.6)	9.2 (20.29)	12.1 (26.68)	16.7 (36.82)	11.5 (25.36)	12 (26.46)	14.7 (32.42)	12.1 (26.68)	13.6 (29.99)	15.2 (33.52)	26.9 (59.32)	8 (25.8)	16.2 (35.72)	27.3 (60.2)

TYPE	REMOTE																					
MODEL CODE	DY080/LT, DY080/HT											DY100/LT, DY100/HT										
PROCESS CONNECTION	BJ1	BJ2	BJ4	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1 BD2	BD3 BD4	CA4	CA5	BJ1	BJ2	BJ4	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1 BD2	BD3 BD4	CA4	CA5
L	200 (7.87)						245 (9.65)	200 (7.87)		235 (9.25)	250 (9.84)	220 (8.66)					240 (9.45)	280 (11.02)	220 (8.66)		270 (10.63)	285 (11.22)
C	71 (2.80)											93.8 (3.69)										
D	185 (7.28)	200 (7.87)	210 (8.27)	190.5 (7.50)	209.6 (8.25)	209.6 (8.25)	241.3 (9.50)	200 (7.87)	200 (7.87)	209.6 (8.25)	241.3 (9.50)	210 (8.27)	225 (8.86)	250 (9.84)	228.6 (9.00)	254 (10.00)	273 (10.75)	292.1 (11.50)	220 (8.66)	235 (9.25)	273 (10.75)	292.1 (11.50)
H	514 (20.24)	522 (20.55)	527 (20.75)	517 (20.35)	527 (20.75)	527 (20.75)	542 (21.34)	522 (20.55)	522 (20.55)	527 (20.75)	542 (21.34)	542 (21.34)	549 (21.61)	562 (22.13)	552 (21.73)	564 (22.20)	573 (22.56)	583 (22.95)	547 (21.54)	554 (21.81)	573 (22.56)	583 (22.95)
H1	318 (12.52)											333 (13.11)										
T	18 (0.71)	22 (0.87)	32 (1.26)	23.9 (0.94)	28.4 (1.12)	38.2 (1.50)	44.5 (1.75)	20 (0.79)	24 (0.94)	39.7 (1.56)	46 (1.81)	18 (0.71)	24 (0.94)	36 (1.42)	23.9 (0.94)	31.8 (1.25)	44.5 (1.75)	50.9 (2.00)	20 (0.79)	24 (0.94)	46 (1.81)	52.4 (2.06)
J	150 (5.91)	160 (6.30)	170 (6.69)	152.4 (6.00)	168.2 (6.62)	168 (6.61)	190.5 (7.50)	160 (6.30)	160 (6.30)	170 (6.69)	180 (7.09)	175 (6.89)	185 (7.28)	205 (8.07)	190.5 (7.50)	200.2 (7.88)	216 (8.50)	235 (9.25)	180 (7.09)	190 (7.48)	216 (8.50)	235 (9.25)
N	8	8	8	4	8	8	8	8	8	8	8	8										
G	19 (0.75)	23 (0.91)	23 (0.91)	19 (0.75)	22.4 (0.88)	22.4 (0.88)	25.4 (1.00)	18 (0.71)	18 (0.71)	22.4 (0.88)	25.4 (1.00)	19 (0.75)	23 (0.91)	25 (0.98)	19 (0.75)	22.4 (0.88)	25.4 (1.00)	31.8 (1.25)	18 (0.71)	22 (0.87)	25.4 (1.00)	31.8 (1.25)
WEIGHT kg (lb)	17.8 (39.25)	20.4 (44.98)	25.8 (56.89)	20.4 (44.98)	24.2 (53.36)	25.8 (56.89)	36.1 (79.6)	19.8 (43.66)	20.4 (44.98)	27.5 (60.64)	36.7 (80.92)	23.2 (51.16)	27.2 (59.98)	38.5 (84.89)	27.7 (61.3)	36.3 (80.04)	51.2 (112.9)	56.3 (124.14)	23.6 (52.04)	27.8 (61.3)	53.2 (117.31)	57 (125.69)

(Note 1) The flow direction is opposite (right to left when facing onto indicator) in case of code/CRC.

■ High Process Temperature Version (/HT): DY150/HT to DY300/HT
■ Flange type

Unit : mm
(approx. inch)



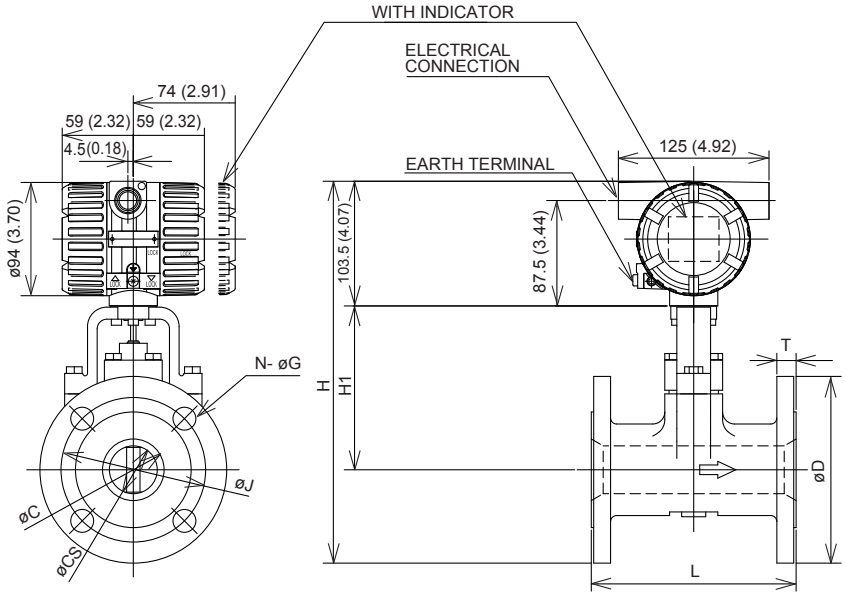
TYPE		REMOTE																							
MODEL CODE		DY150/HT												DY200/HT											
PROCESS CONNECTION		BJ1	BJ2	BJ4	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1 BD2	BD3 BD4	CA4	CA5	BJ1	BJ2	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1	BD2	BD3	BD4	CA4	CA5
L		270 (10.63)					310 (12.20)	336 (13.23)	270 (10.63)		325 (12.80)	340 (13.39)	310 (12.20)				370 (14.57)	386 (15.20)	310 (12.20)				375 (14.77)	390 (15.35)
C		138.8 (5.46)											185.6 (7.31)											
D		280 (11.02)	305 (12.01)	355 (13.98)	279.4 (11.00)	317.5 (12.50)	356 (14.02)	381 (15.00)	285 (11.22)	300 (11.81)	356 (14.02)	381 (15.00)	330 (12.99)	350 (13.78)	342.9 (13.50)	381 (15.00)	419.1 (16.50)	469.9 (18.50)	340 (13.39)	340 (13.39)	360 (14.17)	375 (14.76)	419.1 (16.50)	469.9 (18.50)
H	Shedder Bar Material: X	583 (22.95)	595 (23.43)	620 (24.41)	582 (22.91)	601 (23.66)	621 (24.45)	633 (24.92)	585 (23.03)	593 (23.35)	621 (24.45)	633 (24.92)	640 (25.20)	650 (25.59)	646 (25.43)	665 (26.18)	684 (26.93)	709 (27.91)	645 (25.39)	645 (25.39)	655 (25.79)	662 (26.06)	684 (26.93)	709 (27.91)
	Shedder Bar Material: B	590 (23.23)	602 (23.70)	627 (24.69)	589 (23.19)	608 (23.94)	628 (24.72)	640 (25.20)	592 (23.31)	600 (23.62)	628 (24.72)	640 (25.20)	647 (25.47)	657 (25.87)	653 (25.71)	672 (26.46)	691 (27.20)	716 (28.19)	652 (25.67)	652 (25.67)	662 (26.06)	669 (26.34)	691 (27.20)	716 (28.19)
H1	Shedder Bar Material: X	339 (13.35)											371 (14.61)											
	Shedder Bar Material: B	346 (13.62)											378 (14.88)											
T		22 (0.87)	28 (1.10)	44 (1.73)	25.4 (1.00)	36.6 (1.44)	54.4 (2.14)	62 (2.44)	22 (0.87)	28 (1.10)	55.7 (2.19)	63.6 (2.50)	22 (0.87)	30 (1.18)	28.4 (1.12)	41.1 (1.62)	62 (2.44)	69.9 (2.75)	24 (0.95)	24 (0.95)	30 (1.18)	34 (1.34)	63.6 (2.50)	71.4 (2.81)
J		240 (9.45)	260 (10.24)	295 (11.61)	241.3 (9.50)	269.7 (10.62)	292 (11.50)	317.5 (12.50)	240 (9.45)	250 (9.84)	292 (11.50)	317.5 (12.50)	290 (11.42)	305 (12.01)	298.5 (11.75)	330.2 (13.00)	349.3 (13.75)	393.7 (15.50)	295 (11.61)	295 (11.61)	310 (12.20)	320 (12.60)	349.3 (13.75)	393.7 (15.50)
N		8	12	12	8	12	12	12	8	8	12	12	12	12	8	12	12	12	8	12	12	12	12	12
G		23 (0.91)	25 (0.98)	33 (1.30)	22.4 (0.88)	22.4 (0.88)	28.4 (1.12)	31.8 (1.25)	22 (0.87)	26 (1.02)	28.4 (1.12)	31.8 (1.25)	23 (0.91)	25 (0.98)	22.4 (0.88)	25.4 (1.00)	31.8 (1.25)	38.1 (1.50)	22 (0.87)	22 (0.87)	26 (1.02)	30 (1.18)	31.8 (1.25)	38.1 (1.50)
WEIGHT kg (lb)		33.4 (73.65)	43.4 (95.7)	76.4 (168.46)	36.4 (80.26)	54.4 (119.95)	84.4 (186.1)	106 (233.73)	33.4 (73.65)	42.9 (94.59)	90 (198.45)	107 (235.94)	45.4 (100.11)	52.4 (115.54)	55.4 (122.16)	80.4 (177.28)	136 (299.88)	182 (401.31)	46.3 (102.09)	46.3 (102.091)	53.6 (18.19)	55.9 (123.26)	139 (306.5)	183 (403.52)

TYPE	REMOTE											
MODEL CODE	DY250/HT				DY300/HT				DY400/HT			
PROCESS CONNECTION	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2
L	370 (14.57)				400 (15.75)				520 (20.47)			
C	230.8 (9.09)				276.2 (10.87)				354.2 (13.94)			
D	400 (15.75)	430 (16.93)	406.4 (16.00)	444.5 (17.50)	445 (17.52)	480 (18.90)	482.6 (19.00)	520.7 (20.50)	560 (22.05)	605 (23.82)	596.9 (23.5)	647.7 (25.5)
H	720 (28.35)	735 (28.94)	723 (28.46)	742 (29.21)	772 (30.39)	790 (31.10)	791 (31.14)	810 (31.89)	887.5 (34.94)	910 (35.83)	906 (35.67)	931.4 (36.67)
H1	416 (16.38)				446 (17.56)				504 (19.84)			
T	24 (0.94)	34 (1.34)	30.2 (1.19)	47.8 (1.88)	24 (0.94)	36 (1.42)	31.8 (1.25)	50.8 (2.00)	28 (1.10)	46 (1.81)	36.6 (1.44)	57.2 (2.25)
J	355 (13.98)	380 (14.96)	362 (14.25)	387.4 (15.25)	400 (15.75)	430 (16.93)	431.8 (17.00)	450.9 (17.75)	510 (20.08)	540 (21.26)	539.8 (21.25)	571.5 (22.5)
N	12	12	12	16	16	16	12	16	16	16	16	20
G	25 (0.98)	27 (1.06)	25.4 (1.00)	28.5 (1.12)	25 (0.98)	27 (1.06)	25.4 (1.00)	31.8 (1.25)	27 (1.06)	33 (1.30)	28.5 (1.12)	35.1 (1.38)
WEIGHT kg (lb)	78 (171.99)	100 (220.5)	90 (198.45)	125 (275.63)	100 (220.5)	128 (282.24)	140 (308.7)	178 (392.49)	265 (584.2)	308 (679)	300 (661.4)	370 (815.7)

(Note 1) The flow direction is opposite (right to left when facing onto indicator) in case of code/CRC.

■ Reduced Bore Type (/R1): DY025/R1 to DY150/R1
■ Flange type

Unit : mm
(approx. inch)



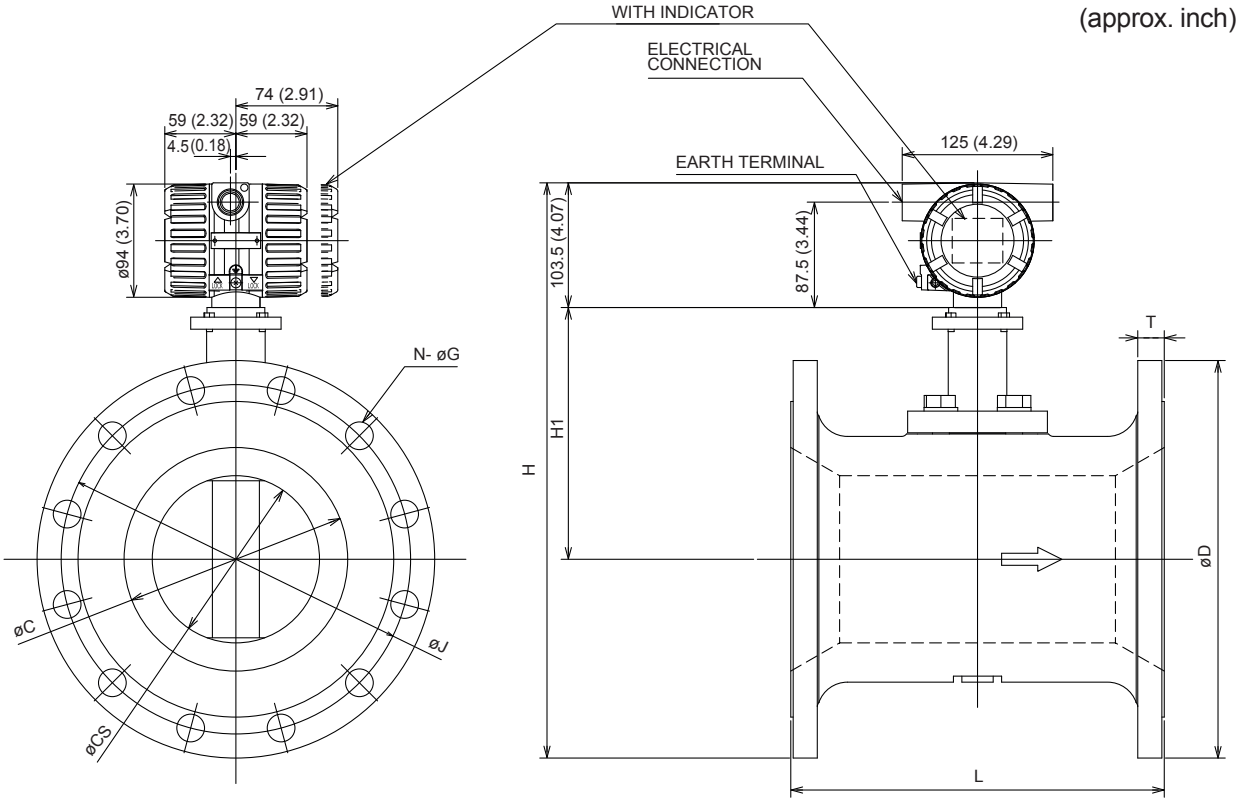
TYPE	INTEGRAL/REMOTE											
MODEL CODE	DY025/R1				DY040/R1				DY050/R1			
PROCESS CONNECTION	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2
L	150 (5.91)				150 (5.90)				170 (6.69)			
C	25.7 (1.01)				39.7 (1.56)				51.1 (2.01)			
CS	14.6 (0.57)				25.7 (1.01)				39.7 (1.56)			
D	125 (4.92)	125 (4.92)	108 (4.25)	124 (4.88)	140 (5.51)	140 (5.51)	127 (5.00)	155.4 (6.12)	155 (6.10)	155 (6.10)	152.4 (6.00)	165.1 (6.50)
H	293 (11.54)	293 (11.54)	284.5 (11.20)	292.5 (11.52)	302.5 (11.91)	302.5 (11.91)	296 (11.65)	310 (12.20)	317 (12.48)	317 (12.48)	315.5 (12.42)	322 (12.68)
H1	127 (5.00)				129 (5.08)				136 (5.35)			
T	14 (0.55)	16 (0.63)	14.2 (0.56)	17.5 (0.69)	16 (0.63)	18 (0.71)	17.5 (0.69)	20.6 (0.81)	16 (0.63)	18 (0.71)	19.1 (0.75)	22.4 (0.88)
J	90 (3.54)	90 (3.54)	79.2 (3.12)	89 (3.50)	105 (4.13)	105 (4.13)	98.6 (3.88)	114.3 (4.5)	120 (4.72)	120 (4.72)	120.7 (4.75)	127 (5.00)
N	4				4				4	8	4	8
G	19 (0.75)	19 (0.75)	15.7 (0.62)	19 (0.75)	19 (0.75)	19 (0.75)	15.7 (0.62)	22.4 (0.88)	19 (0.75)	19 (0.75)	19 (0.75)	19 (0.75)
WEIGHT kg (lb)	6.1 (13.4)	6.5 (14.3)	5.5 (12.1)	7 (15.4)	9.5 (20.9)	10.1 (22.3)	9.4 (20.7)	12.6 (27.8)	10.5 (23.1)	11.1 (24.5)	11.4 (25.1)	13.6 (30.0)

TYPE	INTEGRAL/REMOTE											
MODEL CODE	DY080/R1				DY100/R1				DY150/R1			
PROCESS CONNECTION	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2
L	200 (7.87)				220 (8.66)				270 (10.63)			
C	71 (2.80)				93.8 (3.69)				138.8 (5.46)			
CS	51.1 (2.01)				71 (2.80)				93.8 (3.69)			
D	185 (7.28)	200 (7.87)	190.5 (7.50)	209.6 (8.25)	210 (8.27)	225 (8.86)	228.6 (9.00)	254 (10.00)	280 (11.02)	305 (12.01)	279.4 (11.00)	317.5 (12.50)
H	354 (13.94)	361.5 (14.23)	357 (14.06)	366.5 (14.43)	383.5 (15.10)	391 (15.39)	393 (15.47)	405.5 (15.97)	433.5 (17.07)	446 (17.56)	433 (17.05)	452 (17.80)
H1	158 (6.22)				175 (6.89)				190 (7.48)			
T	18 (0.71)	22 (0.87)	23.9 (0.94)	28.4 (1.12)	18 (0.71)	24 (0.94)	23.9 (0.94)	31.8 (1.25)	22 (0.87)	28 (1.10)	25.4 (1.00)	36.6 (1.44)
J	150 (5.91)	160 (6.30)	152.4 (6.00)	168.2 (6.62)	175 (6.89)	185 (7.28)	190.5 (7.50)	200.2 (7.88)	240 (9.45)	260 (10.24)	241.3 (9.50)	269.7 (10.62)
N	8	8	4	8	8				8	12	8	12
G	19 (0.75)	23 (0.91)	19 (0.75)	22.4 (0.88)	19 (0.75)	23 (0.91)	19 (0.75)	22.4 (0.88)	23 (0.91)	25 (0.98)	22.4 (0.88)	22.4 (0.88)
WEIGHT kg (lb)	18.6 (41.0)	21.7 (47.8)	21.9 (48.3)	26.9 (59.3)	25 (55.1)	30 (66.1)	30.6 (67.5)	41 (90.4)	45.9 (101.2)	56.3 (124.1)	49.4 (108.9)	71.7 (158.1)

(Note 1) Integral weight is the same as Remote.
(Note 2) In case of with Indicator, add 0.2kg.
(Note 3) The flow direction is opposite (right to left when facing onto indicator) in case of code/CRC.

■ Reduced Bore Type (/R1): DY200/R1
■ Flange type

Unit : mm
(approx. inch)



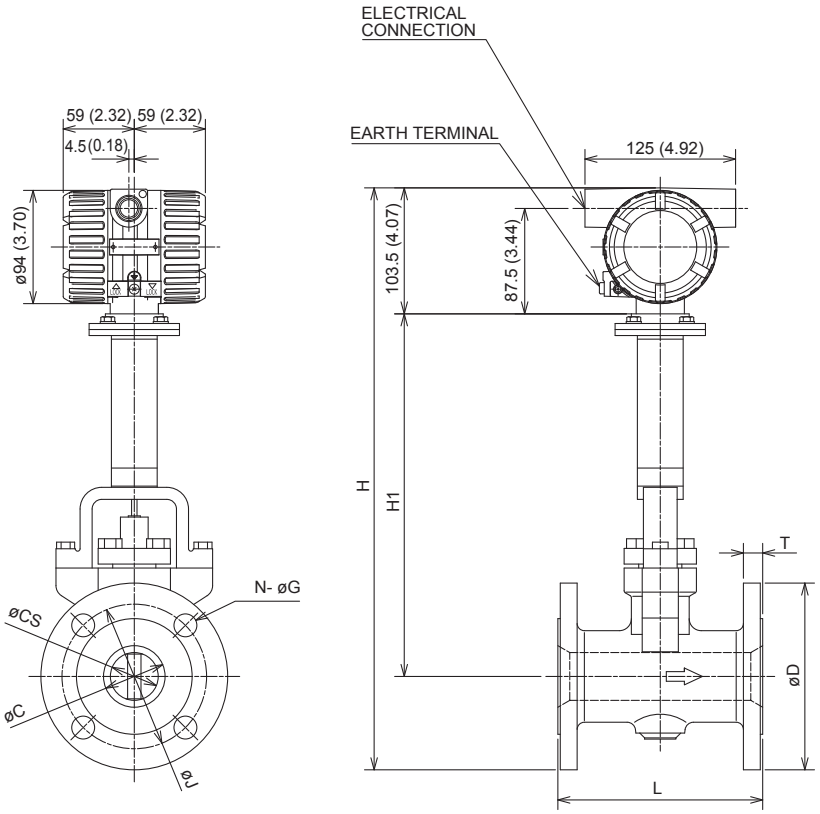
TYPE		INTEGRAL/REMOTE			
MODEL CODE		DY200/R1			
PROCESS CONNECTION		BJ1	BJ2	BA1 BS1	BA2 BS2
L		310 (12.20)			
C		185.6 (7.31)			
CS		138.8 (5.46)			
D		330 (12.99)	350 (13.78)	342.9 (13.50)	381 (15.00)
H	Shedder Bar Material: L, E, X	477.5 (18.80)	487.5 (19.19)	484 (19.06)	503 (19.80)
	Shedder Bar Material: B	484.5 (19.07)	494.5 (19.47)	491 (19.33)	510 (20.08)
H1	Shedder Bar Material: L, E, X	209 (8.23)			
	Shedder Bar Material: B	216 (8.50)			
T		22 (0.87)	30 (1.18)	28.4 (1.12)	41.1 (1.62)
J		290 (11.42)	305 (12.01)	298.5 (11.75)	330.2 (13.00)
N		12	12	8	12
G		23 (0.91)	25 (0.98)	22.4 (0.88)	25.4 (1.00)
WEIGHT kg (lb)		58.7 (129.4)	74.1 (163.4)	70.7 (155.9)	102.9 (226.9)

(Note 1) Integral weight is the same as Remote.
(Note 2) In case of with Indicator, add 0.2kg.
(Note 3) The flow direction is opposite (right to left when facing onto indicator) in case of code/CRC.

■ High Process Temperature Version Reduced Bore Type (/HT/R1): DY040/HT/R1 up to DY150/HT/R1

■ Flange type

Unit : mm
(approx. inch)



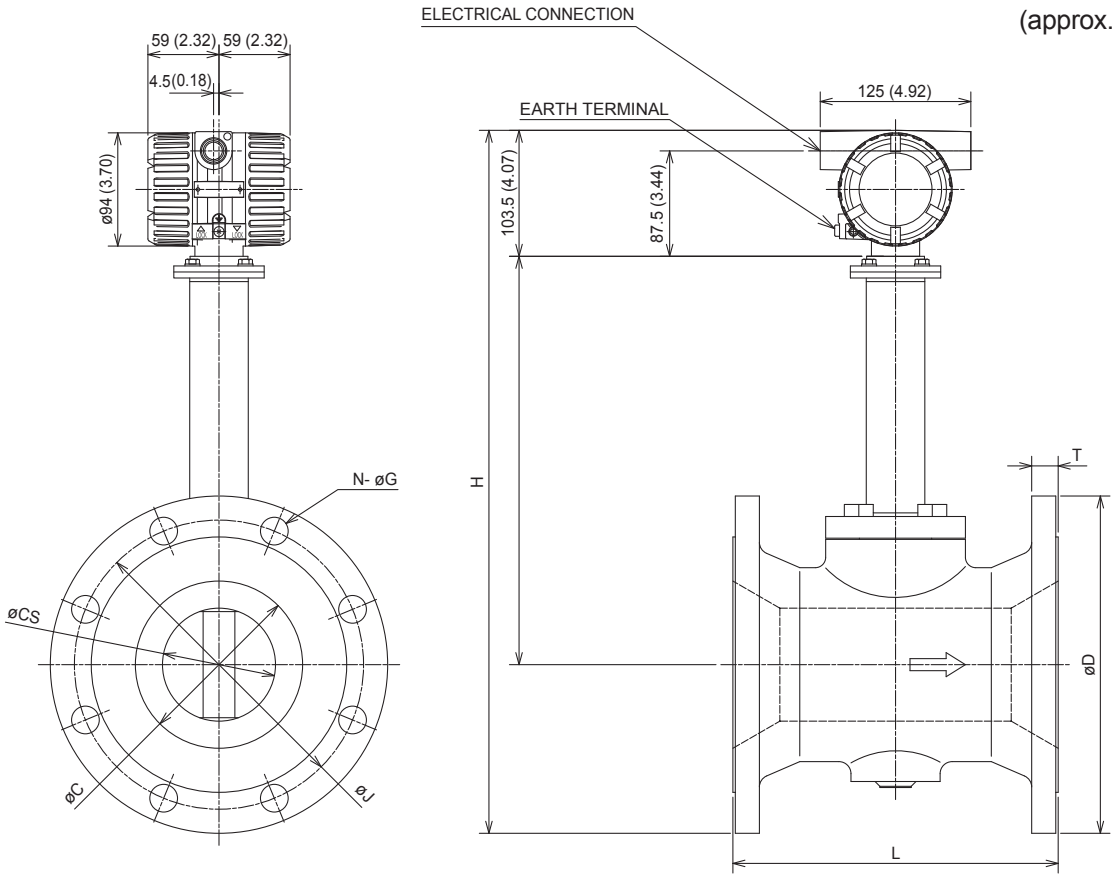
TYPE	REMOTE											
MODEL CODE	DY040/HT/R1				DY050/HT/R1				DY080/HT/R1			
PROCESS CONNECTION	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2
L	150 (5.90)				170 (6.69)				200 (7.87)			
C	39.7 (1.56)				51.1 (2.01)				71 (2.79)			
CS	25.7 (1.01)				39.7 (1.56)				51.1 (2.01)			
D	140 (5.51)	140 (5.51)	127 (5.00)	155.4 (6.12)	155 (6.10)	155 (6.10)	152.4 (6.00)	165.1 (6.50)	185 (7.28)	200 (7.87)	190.5 (7.50)	209.6 (8.25)
H	445.5 (17.54)	445.5 (17.54)	439 (17.28)	453 (17.83)	460 (18.11)	460 (18.11)	458.5 (18.05)	465 (18.30)	497 (19.57)	504.5 (19.86)	500 (19.68)	509.5 (20.05)
H1	272 (10.71)				279 (10.98)				301 (11.85)			
T	16 (0.63)	18 (0.71)	17.5 (0.69)	20.6 (0.81)	16 (0.63)	18 (0.71)	19.1 (0.75)	22.4 (0.88)	18 (0.71)	22 (0.87)	23.9 (0.94)	28.4 (1.11)
J	105 (4.13)	105 (4.13)	98.6 (3.88)	114.3 (4.50)	120 (4.72)	120 (4.72)	120.7 (4.75)	127 (5.00)	150 (5.91)	160 (6.30)	152.4 (6.00)	168.2 (6.62)
N	4				4	8	4	8	8	8	4	8
G	19 (0.75)	19 (0.75)	15.7 (0.62)	22.4 (0.88)	19 (0.75)	19 (0.75)	19 (0.75)	19 (0.75)	19 (0.75)	23 (0.91)	19 (0.75)	22.4 (0.88)
WEIGHT kg (lb)	10 (22.0)	10.5 (23.1)	9.8 (21.6)	13 (28.7)	10.9 (24.0)	11.5 (25.4)	11.8 (26.0)	14 (30.9)	19 (41.9)	22.1 (48.7)	22.3 (49.2)	27.3 (60.2)

TYPE	REMOTE							
MODEL CODE	DY100/HT/R1				DY150/HT/R1			
PROCESS CONNECTION	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2
L	220 (8.66)				270 (10.63)			
C	93.8 (3.69)				138.8 (5.46)			
CS	71 (2.79)				93.8 (3.69)			
D	210 (8.27)	225 (8.86)	228.6 (9.00)	254 (10.00)	280 (11.02)	305 (12.01)	279.4 (11.00)	317.5 (12.50)
H	526.5 (20.73)	534 (21.02)	536 (21.10)	548.5 (21.59)	576.5 (22.70)	589 (23.19)	576 (22.68)	595.5 (23.44)
H1	318 (12.52)				333 (13.11)			
T	18 (0.71)	24 (0.94)	23.9 (0.94)	31.8 (1.25)	22 (0.87)	28 (1.10)	25.4 (1.00)	36.6 (1.44)
J	175 (6.89)	185 (7.28)	190.5 (7.50)	200.2 (7.88)	240 (9.45)	260 (10.24)	241.3 (9.50)	269.7 (10.62)
N	8				8	12	8	12
G	19 (0.75)	23 (0.91)	19 (0.75)	22.4 (0.88)	23 (0.91)	25 (0.98)	22.4 (0.88)	22.4 (0.88)
WEIGHT kg (lb)	25.4 (56.0)	30.4 (67.0)	31 (68.3)	41.4 (91.3)	45.9 (101.2)	56.3 (124.1)	49.4 (108.9)	71.7 (158.1)

(Note 1) The flow direction is opposite (right to left when facing onto indicator) in case of code/CRC.

■ High Process Temperature Version Reduced Bore Type (/HT/R1): DY200/HT/R1
■ Flange type

Unit : mm
(approx. inch)

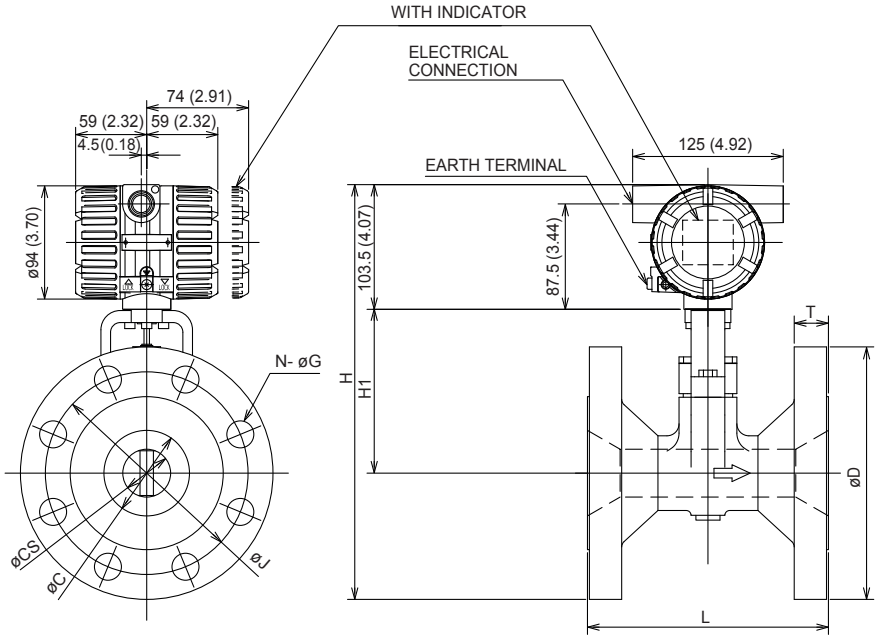


TYPE		REMOTE			
MODEL CODE		DY200/HT/R1			
PROCESS CONNECTION		BJ1	BJ2	BA1 BS1	BA2 BS2
L		310 (12.20)			
C		185.6 (7.31)			
CS		138.8 (5.46)			
D		330 (12.99)	350 (13.78)	342.9 (13.5)	381 (15.0)
H	Shedder Bar Material: X	607.5 (23.92)	617.5 (24.31)	614 (24.17)	633 (24.92)
	Shedder Bar Material: B	614.5 (24.19)	624.5 (24.59)	621 (24.45)	640 (25.20)
H1	Shedder Bar Material: X	339 (13.35)			
	Shedder Bar Material: B	346 (13.62)			
T		22 (0.87)	30 (1.18)	28.4 (1.11)	41.1 (1.62)
J		290 (11.42)	305 (12.01)	298.5 (11.75)	330.2 (13.00)
N		12	12	8	12
G		23 (0.91)	25 (0.98)	22.4 (0.88)	25.4 (1.00)
WEIGHT kg (lb)		58.7 (129.4)	74.1 (163.4)	70.7 (155.9)	102.9 (226.9)

(Note 1) The flow direction is opposite (right to left when facing onto indicator) in case of code/CRC.

■ Reduced Bore Type (/R2): DY040/R2 to DY200/R2
■ Flange type

Unit : mm
(approx. inch)

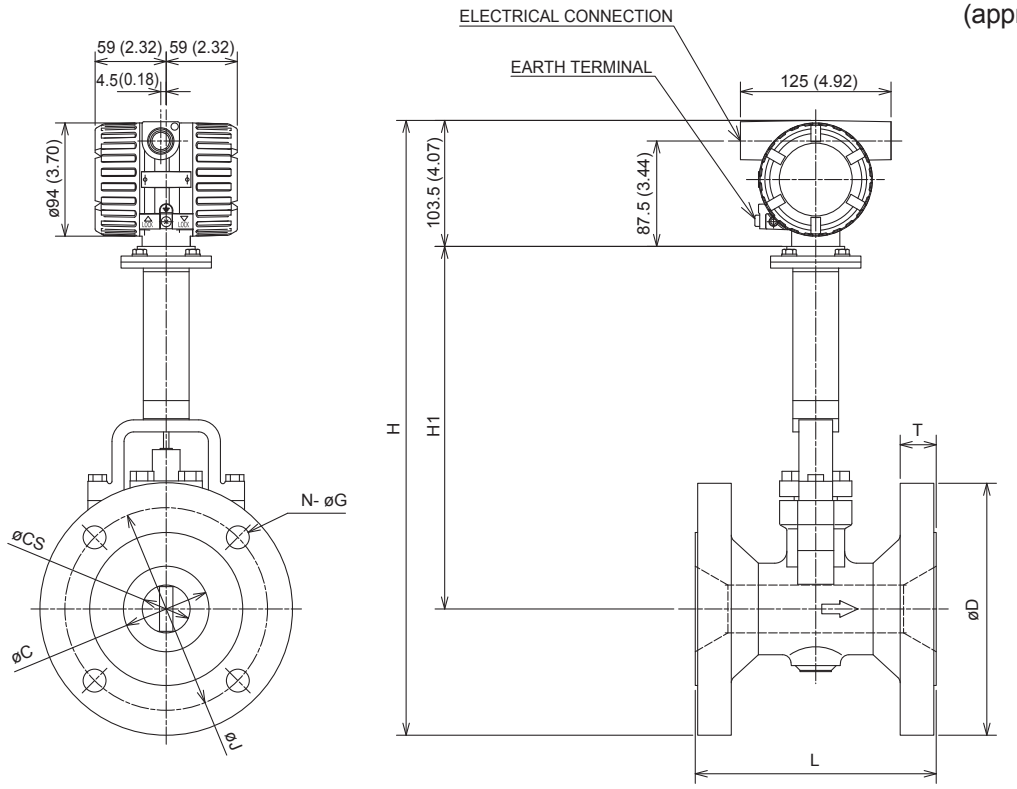


TYPE	INTEGRAL/REMOTE																							
MODEL CODE	DY040/R2				DY050/R2				DY080/R2				DY100 /R2				DY150/R2				DY200/R2			
PROCESS CONNECTION	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2
L	150 (5.90)				170 (6.69)				200 (7.87)				220 (8.66)				270 (10.63)				310 (12.20)			
C	39.7 (1.56)				51.1 (2.01)				71 (2.79)				93.8 (3.69)				138.8 (5.46)				185.6 (7.30)			
CS	14.6 (0.57)				25.7 (1.01)				39.7 (1.56)				51.1 (2.01)				71 (2.79)				93.8 (3.69)			
D	140 (5.51)	140 (5.51)	127 (4.94)	155.4 (6.12)	155 (6.10)	155 (6.10)	152.4 (6.00)	165.1 (6.50)	185 (7.28)	200 (7.87)	190.5 (7.50)	209.6 (8.25)	210 (8.27)	225 (8.86)	228.6 (9.00)	254 (10.00)	280 (11.02)	305 (12.01)	279.4 (11.00)	317.5 (12.50)	330 (12.99)	350 (13.78)	342.9 (13.50)	381 (15.00)
H	300.5 (11.83)	300.5 (11.83)	294 (11.57)	308.2 (12.13)	310 (12.20)	310 (12.20)	308.7 (12.15)	315.1 (12.40)	332 (13.07)	339.5 (13.37)	334.8 (13.18)	344.3 (13.55)	366.5 (14.43)	374 (14.72)	375.8 (14.80)	388.5 (15.30)	418.5 (16.48)	431 (16.97)	418.2 (16.46)	437.3 (17.22)	458.5 (18.05)	468.5 (18.44)	465 (18.31)	484 (19.06)
H1	127 (4.94)				129 (5.07)				136 (5.35)				158 (6.22)				175 (6.89)				190 (7.48)			
T	16 (0.63)	18 (0.71)	17.5 (0.69)	20.6 (0.81)	16 (0.63)	18 (0.71)	19.1 (0.75)	22.4 (0.88)	18 (0.71)	22 (0.87)	23.9 (0.94)	28.4 (1.11)	18 (0.71)	24 (0.94)	23.9 (0.94)	31.8 (1.25)	22 (0.87)	28 (1.10)	25.4 (1.00)	36.6 (1.44)	22 (0.87)	30 (1.18)	28.4 (1.11)	41.1 (1.62)
J	105 (4.13)	105 (4.13)	98.6 (3.88)	114.3 (4.50)	120 (4.72)	120 (4.72)	120.7 (4.75)	127 (5.00)	150 (5.91)	160 (6.30)	152.4 (6.00)	168.2 (6.62)	175 (6.89)	185 (7.28)	190.5 (7.50)	200.2 (7.88)	240 (9.45)	260 (10.24)	241.3 (9.50)	269.7 (10.62)	290 (11.42)	305 (12.01)	298.5 (11.75)	330.2 (13.00)
N	4				4	8	4	8	8	8	4	8	8				8	12	8	12	12	12	8	12
G	19 (0.75)	19 (0.75)	15.7 (0.62)	22.4 (0.88)	19 (0.75)				19 (0.75)	23 (0.91)	19 (0.75)	22.4 (0.88)	19 (0.75)	23 (0.91)	19 (0.75)	22.4 (0.88)	23 (0.91)	25 (0.98)	22.4 (0.88)	22.4 (0.88)	23 (0.91)	25 (0.98)	22.4 (0.88)	25.4 (1.00)
WEIGHT kg (lb)	7.7 (17.0)	7.9 (17.4)	7.6 (16.8)	8.8 (19.4)	10 (22.0)	10.5 (23.1)	10.6 (23.4)	12.1 (26.7)	13.6 (30.0)	16.2 (35.7)	16.2 (35.7)	20 (44.1)	20.9 (46.1)	24.9 (54.9)	25.5 (56.2)	34 (75.0)	40.3 (88.8)	50.3 (110.9)	43.3 (95.5)	61.3 (135.1)	61.9 (136.5)	68.9 (151.9)	71.9 (158.5)	96.9 (213.6)

(Note 1) Integral weight is the same as Remote.
(Note 2) In case of with Indicator, add 0.2kg.
(Note 3) The flow direction is opposite (right to left when facing onto indicator) in case of code/CRC.

■ High Process Temperature Version Reduced Bore Type (/HT/R2): DY050/HT/R2 to DY200/HT/R2

Unit : mm
(approx. inch)

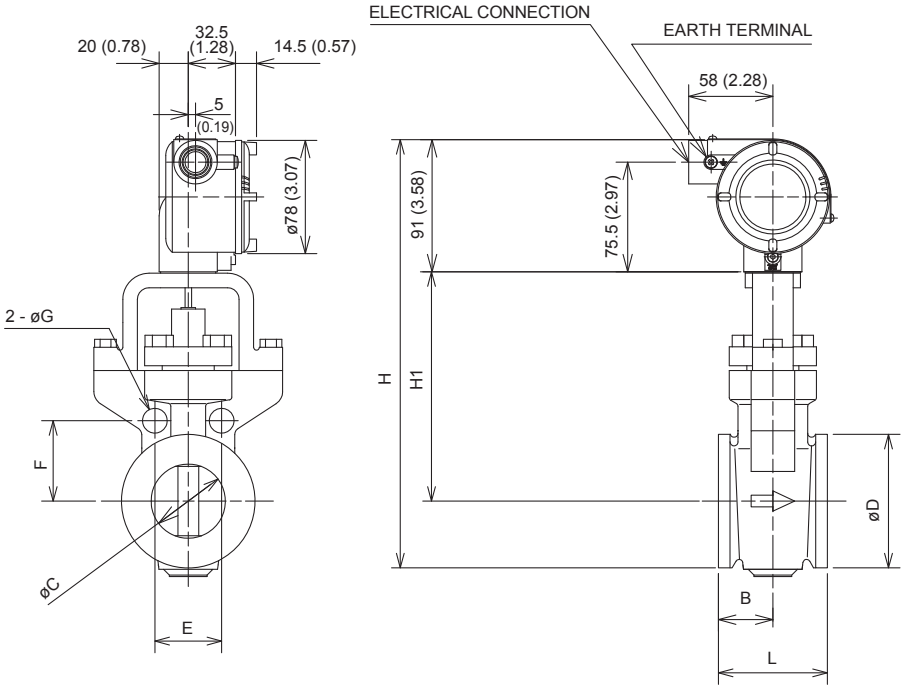


TYPE	REMOTE																			
MODEL CODE	DY050/HT/R2				DY080/HT/R2				DY100 /HT/R2				DY150/HT/R2				DY200/HT/R2			
PROCESS CONNECTION	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2
L	170 (6.69)				200 (7.87)				220 (8.66)				270 (10.63)				310 (12.20)			
C	51.1 (2.01)				71 (2.79)				93.8 (3.69)				138.8 (5.46)				185.6 (7.30)			
CS	25.7 (1.01)				39.7 (1.56)				51.1 (2.01)				71 (2.79)				93.8 (3.69)			
D	155 (6.10)	155 (6.10)	152.4 (6.00)	165.1 (6.50)	185 (7.28)	200 (7.87)	190.5 (7.50)	209.6 (8.25)	210 (8.27)	225 (8.86)	228.6 (9.00)	254 (10.00)	280 (11.02)	305 (12.01)	279.4 (11.00)	317.5 (12.5)	330 (12.99)	350 (13.78)	342.9 (13.5)	381 (15.00)
H	453 (17.95)	453 (17.95)	451.7 (17.78)	458.1 (18.03)	475 (18.70)	482.5 (19.00)	477.8 (18.81)	487.3 (19.19)	509.5 (20.06)	517 (20.35)	518.8 (20.43)	531.5 (20.93)	561.5 (22.11)	574 (22.60)	561.2 (22.09)	580.3 (22.85)	601.5 (23.68)	611.5 (24.07)	608 (23.94)	627 (24.69)
H1	272 (10.71)				279 (10.98)				301 (11.85)				318 (12.52)				333 (13.11)			
T	16 (0.63)	18 (0.71)	19.1 (0.75)	22.4 (0.88)	18 (0.71)	22 (0.87)	23.9 (0.94)	28.4 (1.11)	18 (0.71)	24 (0.94)	23.9 (0.94)	31.8 (1.25)	22 (0.87)	28 (1.10)	25.4 (1.0)	36.6 (1.44)	22 (0.87)	30 (1.18)	28.4 (1.11)	41.1 (1.62)
J	120 (4.72)	120 (4.72)	120.7 (4.75)	127 (5.00)	150 (5.91)	160 (6.30)	152.4 (6.00)	168.2 (6.62)	175 (6.89)	185 (7.28)	190.5 (7.50)	200.2 (7.88)	240 (9.45)	260 (10.24)	241.3 (9.50)	269.7 (10.62)	290 (11.42)	305 (12.01)	298.5 (11.75)	330.2 (13.00)
N	4	8	4	8	8	8	4	8	8				8	12	8	12	12	12	8	12
G	19 (0.75)				19 (0.75)	23 (0.91)	19 (0.75)	22.4 (0.88)	19 (0.75)	23 (0.91)	19 (0.75)	22.4 (0.88)	23 (0.91)	25 (0.98)	22.4 (0.88)	22.4 (0.88)	23 (0.91)	25 (0.98)	22.4 (0.88)	25.4 (1.00)
WEIGHT kg (lb)	10.4 (23.0)	10.9 (24.0)	11 (24.3)	12.5 (27.6)	14 (30.9)	16.6 (36.6)	16.6 (36.6)	20.4 (45.0)	21.3 (47.0)	25.3 (55.8)	25.9 (57.1)	34.4 (75.8)	40.3 (88.8)	50.3 (110.9)	43.3 (95.5)	61.3 (135.1)	61.9 (136.5)	68.9 (151.9)	71.9 (158.5)	96.9 (213.6)

(Note 1) The flow direction is opposite (right to left when facing onto indicator) in case of code/CRC.

■ Stainless Steel Housing: DY015/E1 to DY100/E1
■ Wafer Type

Unit : mm
(approx. inch)



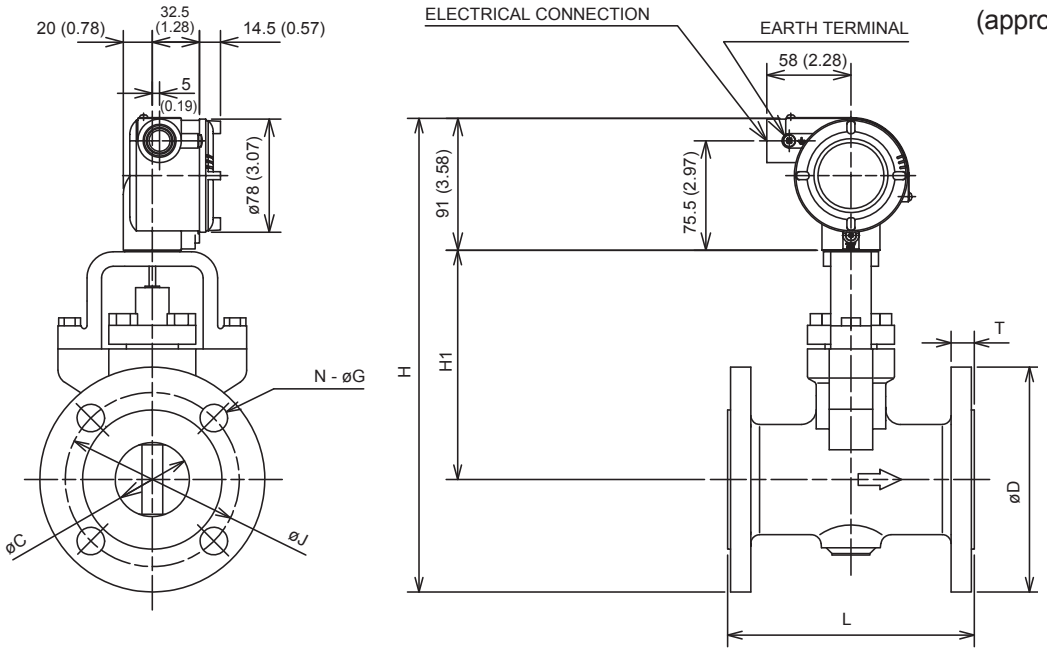
TYPE	REMOTE																						
MODEL CODE	DY015/E1							DY025/E1							DY040/E1								
PROCESS CONNECTION	AJ1	AJ2	AJ4	AA1	AA2	AA4	AD1 to AD4	AJ1	AJ2	AJ4	AA1	AA2	AA4	AD1 to AD4	AJ1	AJ2	AJ4	AA1	AA2	AA4	AD1 to AD4		
L	70 (2.76)							70 (2.76)							70 (2.76)								
B	35 (1.38)							35 (1.38)							35 (1.38)								
C	14.6 (0.57)							25.7(1.01)							39.7 (1.56)								
D	35.1 (1.38)							50.8 (2.00)							73 (2.87)								
H	235.5 (9.27)							245.4 (9.66)							263.5 (10.37)								
H1	127 (5.00)							129 (5.08)							136 (5.35)								
E	49.5 (1.95)	49.5 (1.95)	56.6 (2.23)	42.7 (1.68)	47.1 (1.85)	47.1 (1.85)	46 (1.81)	63.6 (2.50)	63.6 (2.50)	67.2 (2.65)	56 (2.20)	62.9 (2.48)	62.9 (2.48)	60.1 (2.37)	74.2 (2.92)	74.2 (2.92)	84.9 (3.34)	69.7 (2.74)	80.8 (3.18)	80.8 (3.18)	77.8 (3.06)		
F	24.7 (0.97)	24.7 (0.97)	28.3 (1.11)	21.4 (0.84)	23.5 (0.93)	23.5 (0.93)	23 (0.91)	31.8 (1.25)	31.8 (1.25)	33.6 (1.32)	28 (1.10)	31.4 (1.24)	31.4 (1.24)	30.1 (1.19)	37.1 (1.46)	37.1 (1.46)	42.4 (1.67)	34.8 (1.37)	40.4 (1.59)	40.4 (1.59)	38.9 (1.53)		
G	13 (0.51)	13 (0.51)	17 (0.67)	14 (0.55)	14 (0.55)	14 (0.55)	13 (0.51)	17 (0.67)	17 (0.67)	17 (0.67)	14 (0.55)	17 (0.67)	17 (0.67)	13 (0.51)	17 (0.67)	17 (0.67)	21 (0.83)	14 (0.55)	20 (0.79)	20 (0.79)	17 (0.67)		
WEIGHT kg (lb)	2.9 (6.4)							3.8 (8.4)							4.4 (9.7)								

TYPE	REMOTE																						
MODEL CODE	DY050/E1							DY080/E1								DY100/E1								
PROCESS CONNECTION	AJ1	AJ2	AJ4	AA1	AA2	AA4	AD1 to AD4	AJ1	AJ2	AJ4	AA1	AA2	AA4	AD1 AD2	AD3 AD4	AJ1	AJ2	AJ4	AA1	AA2	AA4	AD1 AD2	AD3 AD4
L	75 (2.95)							100 (3.94)								120 (4.72)							
B	37.5 (1.48)							40 (1.57)								50 (1.97)							
C	51.1 (2.01)							71 (2.80)								93.8 (3.69)							
D	92 (3.62)							127 (5.00)								157.2 (6.19)							
H	295 (11.61)							329.5 (12.97)								359.6 (14.16)							
H1	158 (6.22)							175 (6.89)								190 (7.48)							
E		45.9 (1.81)	49.8 (1.96)		48.6 (1.91)	48.6 (1.91)		57.4 (2.26)	61.2 (2.41)	65.1 (2.56)		64.4 (2.54)	64.4 (2.54)	61.2 (2.41)	61.2 (2.41)	67 (2.64)	70.8 (2.79)	78.5 (3.09)	72.9 (2.87)	76.6 (3.02)	82.6 (3.25)	68.9 (2.71)	72.7 (2.86)
F		55.4 (2.18)	60.1 (2.37)		58.7 (2.31)	58.7 (2.31)		69.3 (2.73)	73.9 (2.91)	78.5 (3.09)		77.7 (3.06)	77.7 (3.06)	73.9 (2.91)	73.9 (2.91)	80.8 (3.18)	85.5 (3.37)	94.7 (3.73)	88 (3.46)	92.5 (3.64)	99.7 (3.93)	83.1 (3.27)	87.8 (3.46)
G		17 (0.67)	17 (0.67)		17 (0.67)	17 (0.67)		17 (0.67)	21 (0.83)	21 (0.83)		20 (0.79)	20 (0.79)	17 (0.67)	17 (0.67)	17 (0.67)	21 (0.83)	23 (0.91)	17 (0.67)	20 (0.79)	23 (0.91)	17 (0.67)	21 (0.83)
WEIGHT kg (lb)	6.1 (13.4)							9.5 (20.9)								12.9 (28.4)							

(Note 1) The holes are not provided.
(Note 2) The flow direction is opposite (right to left when facing onto indicator) in case of code/CRC.

■ Stainless Steel Housing: DY015/E1 to DY100/E1
■ Flange type

Unit : mm
(approx. inch)



TYPE	REMOTE																			
MODEL CODE	DY015/E1										DY025/E1									
PROCESS CONNECTION	BJ1	BJ2	BJ4	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1 to BD4	CA4	CA5	BJ1	BJ2	BJ4	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1 to BD4	CA4	CA5
L	130 (5.12)						160 (6.30)	130 (5.12)	140 (5.51)	160 (6.30)	150 (5.91)						190 (7.48)	150 (5.91)	170 (6.69)	190 (7.48)
C	14.6 (0.58)										25.7 (1.01)									
D	95 (3.74)	95 (3.74)	115 (4.53)	88.9 (3.5)	95.3 (3.75)	95.3 (3.75)	120.7 (4.75)	95 (3.74)	95.3 (3.75)	120.7 (4.75)	125 (4.92)	125 (4.92)	130 (5.12)	108 (4.25)	124 (4.88)	124 (4.88)	149.4 (5.87)	115 (4.53)	124 (4.88)	149.4 (5.87)
H	265.5 (10.45)	265.5 (10.45)	275.5 (10.85)	262.5 (10.33)	265.5 (10.45)	265.5 (10.45)	278.5 (10.96)	265.5 (10.45)	265.5 (10.45)	278.5 (10.96)	282.5 (11.12)	282.5 (11.12)	285 (11.22)	274 (10.79)	282 (11.10)	282 (11.10)	294.7 (11.60)	277.5 (10.93)	282 (11.10)	294.7 (11.60)
H1	127 (5)										129 (5.08)									
T	12 (0.47)	14 (0.55)	20 (0.79)	11.2 (0.44)	14.2 (0.56)	21 (0.83)	28.8 (1.13)	16 (0.63)	19.9 (0.78)	28.8 (1.13)	14 (0.55)	16 (0.63)	22 (0.87)	14.2 (0.56)	17.5 (0.69)	24 (0.95)	34.9 (1.37)	18 (0.71)	24 (0.95)	34.9 (1.37)
J	70 (2.76)	70 (2.76)	80 (3.15)	60.5 (2.38)	66.5 (2.62)	66.5 (2.62)	82.6 (3.25)	65 (2.56)	66.5 (2.62)	82.6 (3.25)	90 (3.54)	90 (3.54)	95 (3.74)	79.2 (3.12)	89 (3.51)	89 (3.51)	101.6 (4.00)	85 (3.35)	89 (3.50)	101.6 (4.00)
N	4										4									
G	15 (0.59)	15 (0.59)	19 (0.75)	15.7 (0.62)	15.7 (0.62)	15.7 (0.62)	22.4 (0.88)	14 (0.55)	15.7 (0.62)	22.4 (0.88)	19 (0.75)	19 (0.75)	19 (0.75)	15.7 (0.62)	19 (0.75)	19 (0.75)	25.4 (1.00)	14 (0.55)	19 (0.75)	25.4 (1.00)
WEIGHT kg (lb)	4.3 (9.5)	4.4 (9.7)	6 (13.2)	4.2 (9.3)	4.4 (9.7)	4.7 (10.4)	6.8 (15.0)	4.3 (9.5)	4.6 (10.1)	6.9 (15.2)	7 (15.4)	7.2 (15.9)	8.7 (19.2)	6.7 (14.8)	7.3 (16.1)	7.8 (17.2)	11.2 (24.7)	7 (15.4)	8 (17.6)	11.5 (25.4)

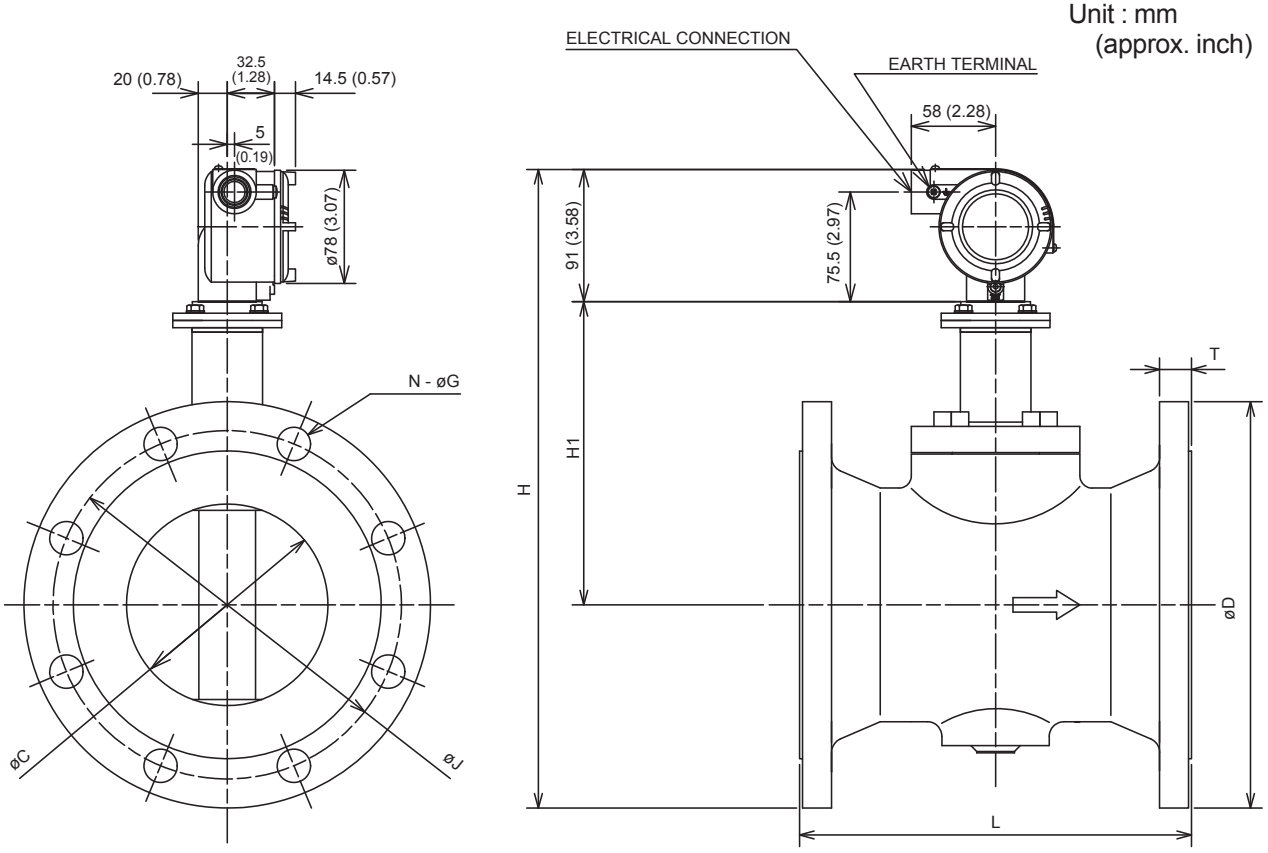
TYPE	REMOTE																			
MODEL CODE	DY040/E1										DY050/E1									
PROCESS CONNECTION	BJ1	BJ2	BJ4	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1 to BD4	CA4	CA5	BJ1	BJ2	BJ4	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1 to BD4	CA4	CA5
L	150 (5.90)						200 (7.88)	150 (5.90)	185 (7.28)	200 (7.88)	170 (6.69)						230 (9.06)	170 (6.69)	205 (8.07)	230 (9.06)
C	39.7 (1.56)										51.1 (2.01)									
D	140 (5.51)	140 (5.51)	160 (6.30)	127 (5.00)	155.4 (6.12)	155.4 (6.12)	177.8 (7.00)	150 (5.90)	155.4 (6.12)	177.8 (7.00)	155 (6.10)	155 (6.10)	165 (6.50)	152.4 (6.00)	165.1 (6.50)	165.1 (6.50)	215.9 (8.50)	165 (6.50)	165.1 (6.50)	215.9 (8.50)
H	297 (11.69)	297 (11.69)	307 (12.09)	290.5 (11.44)	304.7 (12.00)	304.7 (12.00)	315.9 (12.44)	302 (11.89)	304.7 (12.00)	315.9 (12.44)	326.5 (12.85)	326.5 (12.85)	331.5 (13.05)	325.2 (12.81)	331.5 (13.05)	331.5 (13.05)	357 (14.06)	331.5 (13.05)	331.5 (13.05)	357 (14.06)
H1	136 (5.36)										158 (6.22)									
T	16 (0.63)	18 (0.71)	26 (1.02)	17.5 (0.69)	20.6 (0.81)	28.8 (1.13)	38.2 (1.51)	18 (0.71)	28.8 (1.13)	38.2 (1.51)	16 (0.63)	18 (0.71)	26 (1.02)	19.1 (0.75)	22.4 (0.88)	31.8 (1.25)	44.5 (1.75)	20 (0.79)	33.3 (1.31)	46 (1.81)
J	105 (4.13)	105 (4.13)	120 (4.72)	98.6 (3.88)	114.3 (4.50)	114.3 (4.50)	124 (4.88)	110 (4.33)	114.3 (4.50)	124 (4.88)	120 (4.72)	120 (4.72)	130 (5.12)	120.7 (4.75)	127 (5.00)	127 (5.00)	165.1 (6.50)	125 (4.92)	127 (5.00)	165.1 (6.50)
N	4										4	8	8	4	8	8	8	4	8	8
G	19 (0.75)	19 (0.75)	23 (0.91)	15.7 (0.62)	22.4 (0.88)	22.4 (0.88)	28.4 (1.12)	18 (0.71)	22.4 (0.88)	28.4 (1.12)	19 (0.75)	19 (0.75)	19 (0.75)	19 (0.75)	19 (0.75)	19 (0.75)	25.4 (1.00)	18 (0.71)	19 (0.75)	25.4 (1.00)
WEIGHT kg (lb)	8.3 (18.3)	8.5 (18.7)	12 (26.5)	8.2 (18.1)	9.4 (20.7)	11.4 (25.1)	16.3 (36.0)	8.9 (19.6)	11.8 (26.0)	16.4 (36.2)	11.2 (24.7)	11.7 (25.8)	14.4 (31.7)	11.8 (26.0)	13.3 (29.3)	14.9 (32.8)	26.6 (58.6)	11.4 (25.1)	15.9 (35.1)	27 (60.0)

TYPE	REMOTE																					
MODEL CODE	DY080/E1										DY100/E1											
PROCESS CONNECTION	BJ1	BJ2	BJ4	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1 BD2	BD3 BD4	CA4	CA5	BJ1	BJ2	BJ4	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1 BD2	BD3 BD4	CA4	CA5
L	200 (7.88)						245 (9.65)	200 (7.88)		235 (9.25)	250 (9.84)	220 (8.66)					240 (9.45)	280 (11.02)	220 (8.66)		270 (10.63)	285 (11.22)
C	71 (2.80)											93.8 (3.69)										
D	185 (7.28)	200 (7.87)	210 (8.27)	190.5 (7.50)	209.6 (8.25)	209.6 (8.25)	241.3 (9.50)	200 (7.87)	200 (7.87)	209.6 (8.25)	241.3 (9.50)	210 (8.27)	225 (8.86)	250 (9.84)	228.6 (9.00)	254 (10.00)	273 (10.75)	292.1 (11.50)	220 (8.66)	235 (9.25)	273 (10.75)	292.1 (11.50)
H	358.5 (14.11)	366 (14.41)	371 (14.61)	361.5 (14.23)	370.8 (14.60)	370.8 (14.60)	386.5 (15.22)	366 (14.41)	366 (14.41)	370.8 (14.60)	386.5 (15.22)	386 (15.20)	393.5 (15.49)	406 (15.98)	395.3 (15.56)	408 (16.06)	417.5 (16.44)	427 (16.81)	391 (15.39)	398.5 (15.69)	417.5 (16.44)	427 (16.81)
H1	175 (6.89)											190 (7.48)										
T	18 (0.71)	22 (0.87)	32 (1.26)	23.9 (0.94)	28.4 (1.12)	38.2 (1.51)	44.5 (1.75)	20 (0.79)	24 (0.94)	39.7 (1.56)	46 (1.81)	18 (0.71)	24 (0.94)	36 (1.42)	23.9 (0.94)	31.8 (1.25)	44.5 (1.75)	50.9 (2.00)	20 (0.79)	24 (0.94)	46 (1.81)	52.4 (2.06)
J	150 (5.91)	160 (6.30)	170 (6.69)	152.4 (6.00)	168.2 (6.62)	168 (6.61)	190.5 (7.50)	160 (6.30)	160 (6.30)	168 (6.61)	190.5 (7.50)	175 (6.89)	185 (7.28)	205 (8.07)	190.5 (7.50)	200.2 (7.88)	216 (8.50)	235 (9.25)	180 (7.09)	190 (7.48)	216 (8.50)	235 (9.25)
N	8	8	8	4	8	8	8	8	8	8	8	8										
G	19 (0.75)	23 (0.91)	23 (0.91)	19 (0.75)	22.4 (0.88)	22.4 (0.88)	25.4 (1.00)	18 (0.71)	18 (0.71)	22.4 (0.88)	25.4 (1.00)	19 (0.75)	23 (0.91)	25 (0.98)	19 (0.75)	22.4 (0.88)	25.4 (1.00)	31.8 (1.25)	18 (0.71)	22 (0.87)	25.4 (1.00)	31.8 (1.25)
WEIGHT kg (lb)	17.5 (38.6)	20.1 (44.3)	25.5 (56.2)	20.1 (44.3)	23.9 (52.7)	25.5 (56.2)	35.8 (80.0)	19.5 (43.0)	20.1 (44.3)	27.2 (60.1)	36.4 (80.2)	22.9 (50.5)	26.9 (59.3)	38.2 (84.2)	27.5 (61.0)	36 (79.4)	50.9 (112.2)	56 (123.4)	23.3 (51.4)	27.5 (61.0)	52.9 (117.0)	56.7 (125.0)

(Note 1) The flow direction is opposite (right to left when facing onto indicator) in case of code/CRC.

■ Stainless Steel Housing: DY150/E1 to DY400/E1
■ Flange type

Unit : mm
(approx. inch)



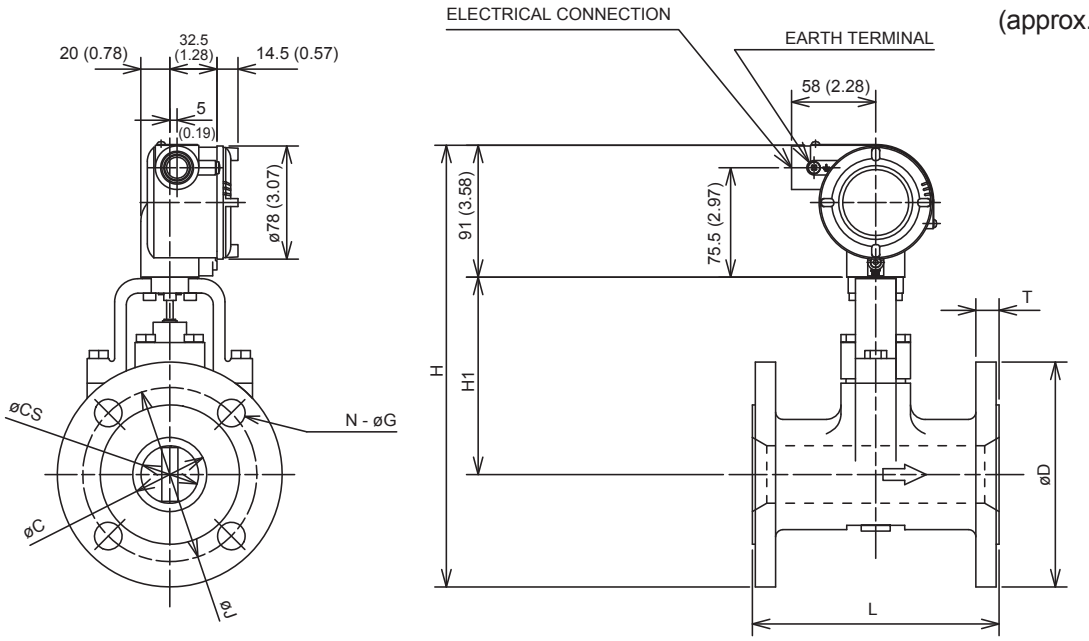
TYPE		REMOTE																									
MODEL CODE		DY150/E1												DY200/E1													
PROCESS CONNECTION		BJ1	BJ2	BJ4	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1 BD2	BD3 BD4	CA4	CA5	BJ1	BJ2	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1	BD2	BD3	BD4	CA4	CA5
L		270 (10.63)					310 (12.20)	336 (13.23)	270 (10.63)		325 (12.80)	340 (13.39)	310 (12.21)				370 (14.57)	386 (15.20)	310 (12.21)				375 (14.76)	390 (15.35)
C		138.8 (5.46)											185.6											
D		280 (11.02)	305 (12.01)	355 (13.98)	279.4 (11.00)	317.5 (12.50)	356 (14.02)	381 (15.00)	285 (11.22)	300 (11.81)	356 (14.02)	381 (15.00)	330 (12.99)	350 (13.78)	342.9 (13.50)	381 (15.00)	419.1 (16.50)	469.9 (18.50)	340 (13.39)	340 (13.39)	360 (14.17)	375 (14.76)	419.1 (16.50)	469.9 (18.50)
H	Shedder Bar Material: L, E, X	440 (17.32)	452.4 (17.81)	477.5 (18.80)	439.7 (17.31)	458.5 (18.05)	478 (18.82)	490.5 (19.31)	442.5 (17.42)	450 (17.72)	478 (18.82)	490.5 (19.31)	497 (19.57)	507 (19.96)	503.5 (19.82)	522.5 (20.57)	541.5 (21.32)	567 (22.32)	502 (19.76)	502 (19.76)	512 (20.16)	519.5 (20.45)	541.5 (21.32)	567 (22.32)
	Shedder Bar Material: B	447 (17.60)	459.4 (18.09)	484.5 (19.07)	446.7 (17.59)	465.5 (18.33)	485 (19.09)	497.5 (19.59)	449.5 (17.70)	457 (17.99)	485 (19.09)	497.5 (19.59)	504 (19.84)	514 (20.24)	510.5 (20.10)	529.5 (20.85)	548.5 (21.59)	574 (22.60)	509 (20.04)	509 (20.04)	519 (20.43)	526.5 (20.73)	548.5 (21.59)	574 (22.60)
H1	Shedder Bar Material: L, E, X	209 (8.23)											241 (9.49)											
	Shedder Bar Material: B	216 (8.50)											248 (9.76)											
T		22 (0.87)	28 (1.10)	44 (1.73)	25.4 (1.00)	36.6 (1.44)	54.4 (2.14)	62 (2.44)	22 (0.87)	28 (1.10)	55.7 (2.19)	63.6 (2.50)	22 (0.87)	30 (1.18)	28.4 (1.12)	41.1 (1.62)	62 (2.44)	69.9 (2.75)	24 (0.94)	24 (0.94)	30 (1.18)	34 (1.34)	63.6 (2.50)	71.4 (2.81)
J		240 (9.45)	260 (10.24)	295 (11.61)	241.3 (9.50)	269.7 (10.62)	292 (11.50)	317.5 (12.50)	240 (9.45)	250 (9.84)	292 (11.50)	317.5 (12.50)	290 (11.42)	305 (12.01)	298.5 (11.74)	330.2 (13.00)	349.3 (13.75)	393.7 (15.50)	295 (11.61)	295 (11.61)	310 (12.20)	320 (12.60)	349.3 (13.75)	393.7 (15.50)
N		8	12	12	8	12	12	12	8	8	12	12	12	12	8	12	12	12	8	12	12	12	12	12
G		23 (0.91)	25 (0.98)	33 (1.30)	22.4 (0.88)	22.4 (0.88)	28.4 (1.12)	31.8 (1.25)	22 (0.87)	26 (1.02)	28.4 (1.12)	31.8 (1.25)	23 (0.91)	25 (0.98)	22.4 (0.88)	25.4 (1.00)	31.8 (1.25)	38.1 (1.50)	22 (0.87)	22 (0.87)	26 (1.02)	30 (1.18)	31.8 (1.25)	38.1 (1.50)
WEIGHT kg (lb)		33.5 (73.9)	43.5 (96.0)	76.5 (168.7)	36.5 (80.5)	54.5 (120.2)	84.5 (186.3)	106.1 (234.0)	33.5 (73.9)	43 (94.8)	90.1 (198.7)	107.1 (236.1)	45.5 (100.3)	52.5 (115.7)	55.5 (122.4)	80.5 (177.5)	136.1 (300.0)	182.1 (401.5)	46.4 (102.3)	46.4 (102.3)	53.7 (118.4)	56 (123.5)	139.1 (306.7)	183.1 (403.7)

TYPE	REMOTE											
MODEL CODE	DY250/E1				DY300/E1				DY400/E1			
PROCESS CONNECTION	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2
L	370 (14.57)				400 (15.75)				520 (20.47)			
C	230.8 (9.09)				276.2 (10.87)				354.2 (13.94)			
D	400 (15.75)	430 (16.93)	406.4 (16.00)	444.5 (17.50)	445 (17.52)	480 (18.90)	482.6 (19.00)	520.7 (20.50)	560 (22.05)	605 (23.82)	596.9 (23.50)	647.7 (25.50)
H	568 (22.36)	583 (23.07)	571.2 (22.49)	590.5 (23.25)	620.5 (24.43)	638 (25.12)	639.3 (25.17)	658.5 (25.93)	745 (29.33)	767.5 (30.22)	763.5 (30.06)	788.5 (31.04)
H1	277 (10.91)				307 (12.09)				374 (14.72)			
T	24 (0.94)	34 (1.34)	30.2 (1.19)	47.8 (1.88)	24 (0.94)	36 (1.42)	31.8 (1.25)	50.8 (2.00)	28 (1.10)	46 (1.81)	36.6 (1.44)	57.2 (2.25)
J	355 (13.98)	380 (14.96)	362 (14.25)	387.4 (15.25)	400 (15.75)	430 (16.93)	431.8 (17.00)	450.9 (17.75)	510 (20.08)	540 (21.26)	539.8 (21.25)	571.5 (22.50)
N	12	12	12	16	16	16	12	16	16	16	16	20
G	25 (0.98)	27 (1.06)	25.4 (1.00)	28.5 (1.12)	25 (0.98)	27 (1.06)	25.4 (1.00)	31.8 (1.25)	27 (1.06)	33 (1.30)	28.5 (1.22)	35.1 (1.38)
WEIGHT kg (lb)	78.1 (172.1)	100.1 (220.7)	90.1 (198.7)	125.1 (275.8)	100.1 (220.7)	128.1 (282.4)	140.1 (308.9)	178.1 (392.6)	265.1 (584.4)	308.1 (679.2)	300.1 (661.6)	370.1 (816.0)

(Note 1) The flow direction is opposite (right to left when facing onto indicator) in case of code/CRC.

■ Stainless Steel Housing Reduced Bore Type (/R1/E1): DY025/R1/E1 to DY150/R1/E1
■ Flange type

Unit : mm
(approx. inch)

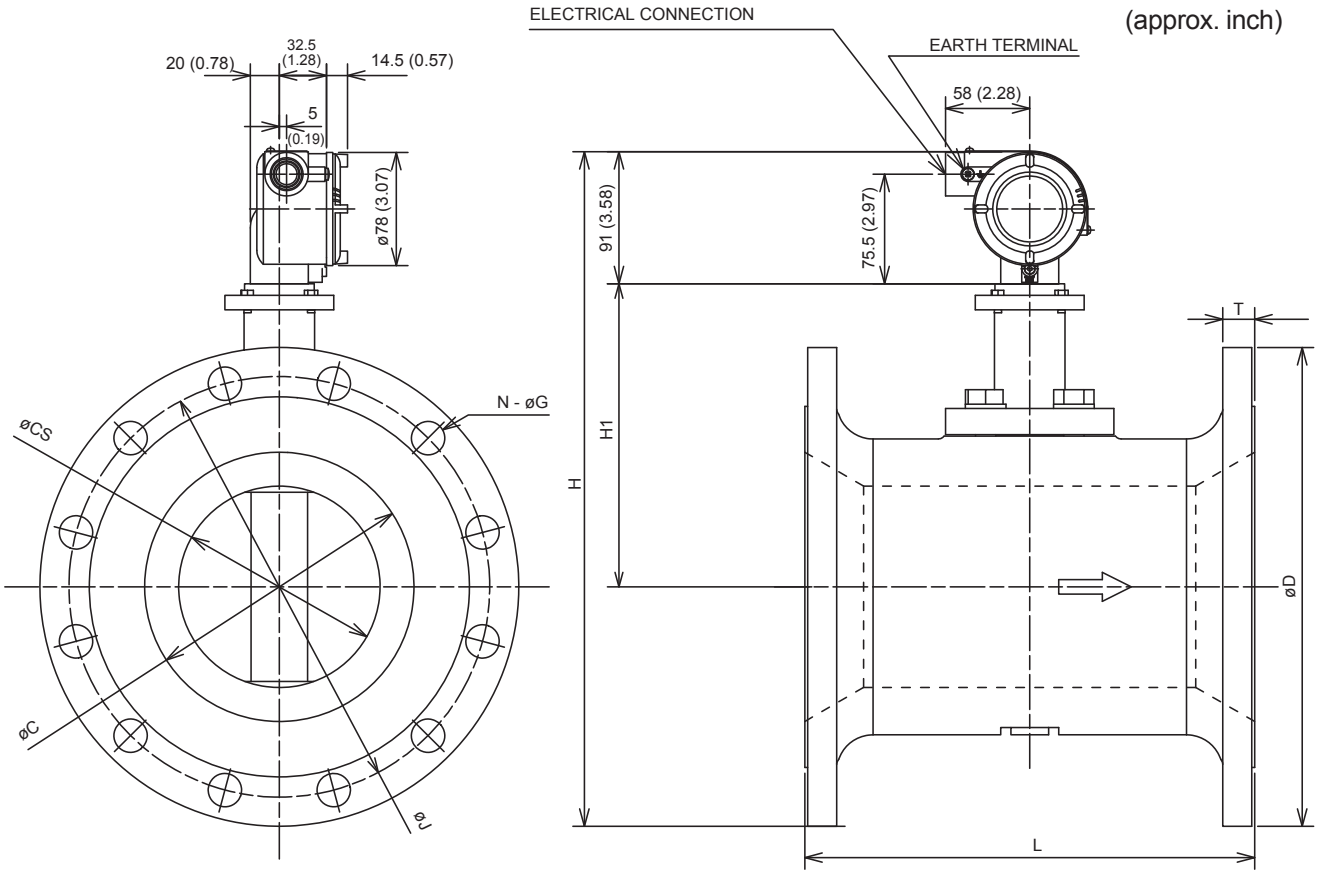


TYPE	REMOTE																							
MODEL CODE	DY025/R1/E1				DY040/R1/E1				DY050/R1/E1				DY080/R1/E1				DY100/R1/E1				DY150/R1/E1			
PROCESS CONNECTION	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2
L	150 (5.91)				150 (5.91)				170 (6.69)				200 (7.87)				220 (8.66)				270 (10.63)			
C	25.7 (1.01)				39.7 (1.56)				51.1 (2.01)				71 (2.79)				93.8 (3.69)				138.8 (5.46)			
CS	14.6 (0.57)				25.7 (1.01)				39.7 (1.56)				51.1 (2.01)				71 (2.79)				93.8 (3.69)			
D	125 (4.92)	125 (4.92)	108 (4.25)	124 (4.88)	140 (5.51)	140 (5.51)	127 (4.94)	155.4 (6.12)	155 (6.10)	155 (6.10)	152.4 (6.00)	165.1 (6.50)	185 (7.28)	200 (7.87)	190.5 (7.50)	209.6 (8.25)	210 (8.27)	225 (8.86)	228.6 (9.00)	254 (10.00)	280 (11.02)	305 (12.01)	279.4 (11.00)	317.5 (12.50)
H	280.5 (11.04)	280.5 (11.04)	272 (10.71)	280 (11.02)	290 (11.42)	290 (11.42)	283.5 (11.16)	297.7 (11.72)	304.5 (11.99)	304.5 (11.99)	303.2 (11.94)	309.5 (12.16)	341.5 (13.44)	349 (13.74)	344.5 (13.57)	353.8 (13.93)	371 (14.61)	378.5 (14.90)	380.3 (14.97)	393 (15.47)	421 (16.57)	433.5 (17.07)	420.7 (16.56)	439.5 (17.31)
H1	127 (5.00)				129 (5.07)				136 (5.35)				158 (6.22)				175 (6.89)				190 (7.48)			
T	14 (0.55)	16 (0.63)	14.2 (0.56)	17.5 (0.69)	16 (0.63)	18 (0.71)	17.5 (0.69)	20.6 (0.81)	16 (0.63)	18 (0.71)	19.1 (0.75)	22.4 (0.88)	18 (0.71)	22 (0.87)	23.9 (0.94)	28.4 (1.11)	18 (0.71)	24 (0.94)	23.9 (0.94)	31.8 (1.25)	22 (0.87)	28 (1.10)	25.4 (1.00)	36.6 (1.44)
J	90 (3.54)	90 (3.54)	79.2 (3.12)	89 (3.50)	105 (4.13)	105 (4.13)	98.6 (3.88)	114.3 (4.50)	120 (4.72)	120 (4.72)	120.7 (4.75)	127 (5.00)	150 (5.91)	160 (6.30)	152.4 (6.00)	168.2 (6.62)	175 (6.89)	185 (7.28)	190.5 (7.50)	200.2 (7.88)	240 (9.45)	260 (10.24)	241.3 (9.50)	269.7 (10.62)
N	4				4				4	8	4	8	8	8	4	8	8				8	12	8	12
G	19 (0.75)	19 (0.75)	15.7 (0.62)	19 (0.75)	19 (0.75)	19 (0.75)	15.7 (0.62)	22.4 (0.88)	19 (0.75)	19 (0.75)	19 (0.75)	19 (0.75)	19 (0.75)	23 (0.91)	19 (0.75)	22.4 (0.88)	19 (0.75)	23 (0.91)	19 (0.75)	22.4 (0.88)	23 (0.91)	25 (0.98)	22.4 (0.88)	22.4 (0.88)
WEIGHT kg (lb)	6.2 (13.7)	6.6 (14.6)	5.6 (12.3)	7.1 (15.7)	9.7 (21.4)	10.2 (922.5)	9.5 (21.0)	12.7 (30.1)	10.6 (23.4)	11.2 (24.7)	11.5 (25.4)	13.7 (30.2)	18.7 (41.2)	21.8 (48.1)	22 (49.0)	27 (60.0)	25.1 (55.3)	30.1 (66.4)	30.7 (67.7)	41.4 (91.3)	46 (101.4)	56.4 (124.3)	49.5 (109.1)	71.8 (158.3)

(Note 1) The flow direction is opposite (right to left when facing onto indicator) in case of code/CRC.

■ Stainless Steel Housing Reduced Bore Type (/R1/E1): DY200/R1/E1
■ Flange type

Unit : mm
(approx. inch)



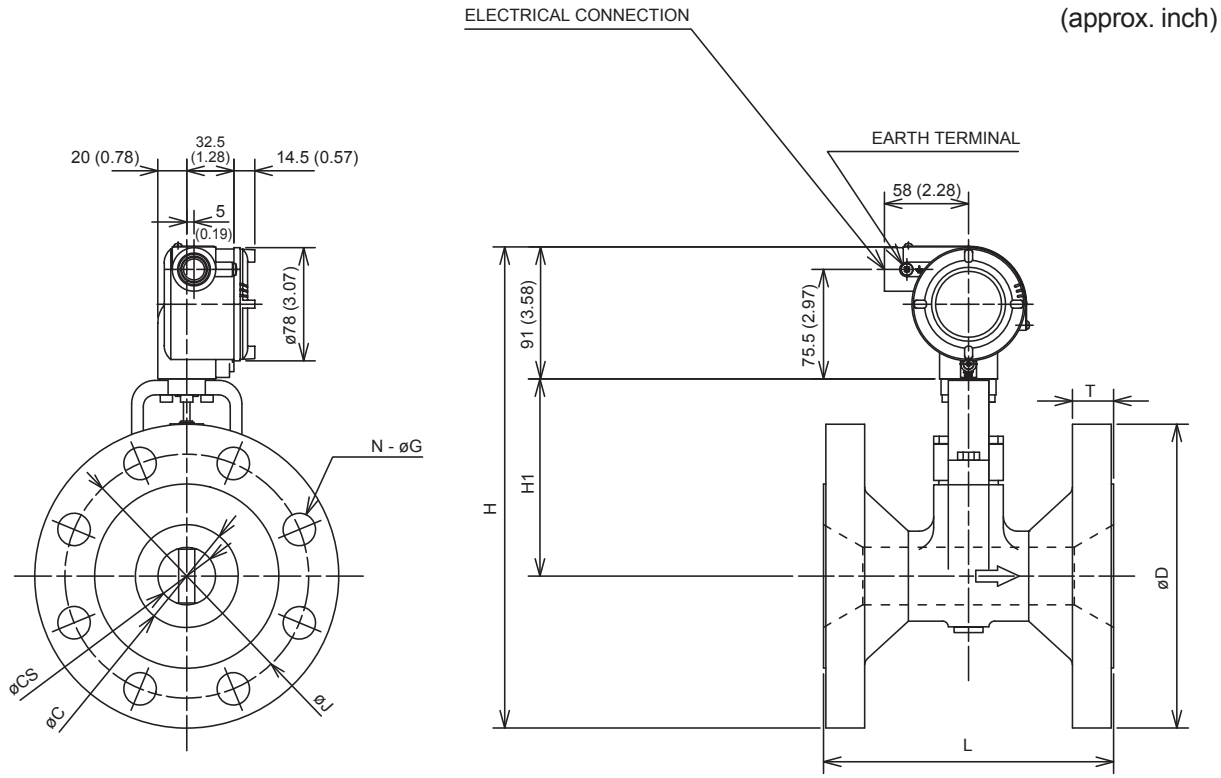
TYPE		REMOTE			
MODEL CODE		DY200/R1/E1			
PROCESS CONNECTION		BJ1	BJ2	BA1 BS1	BA2 BS2
L		310 (12.20)			
C		185.6 (7.31)			
CS		138.8 (5.46)			
D		330 (12.99)	350 (13.78)	342.9 (13.50)	381 (15.00)
H	Shedder Bar Material: L, E, X	465 (18.31)	475 (18.70)	471.5 (18.56)	490.5 (19.31)
	Shedder Bar Material: B	472 (18.58)	482 (18.98)	478.5 (18.84)	497.5 (19.59)
H1	Shedder Bar Material: L, E, X	209 (8.23)			
	Shedder Bar Material: B	216 (8.50)			
T		22 (0.87)	30 (1.18)	28.4 (1.12)	41.1 (1.62)
J		290 (11.42)	305 (12.01)	298.5 (11.75)	330.2 (13.00)
N		12	12	8	12
G		23 (0.91)	25 (0.98)	22.4 (0.88)	25.4 (1.00)
WEIGHT kg (lb)		58.8 (129.6)	74.2 (163.6)	70.8 (156.1)	103 (227.1)

(Note 1) The flow direction is opposite (right to left when facing onto indicator) in case of code/CRC.

■ Stainless Steel Housing Reduced Bore Type (/R2/E1): DY040/R1/E1 to DY200/R2/E1

■ Flange type

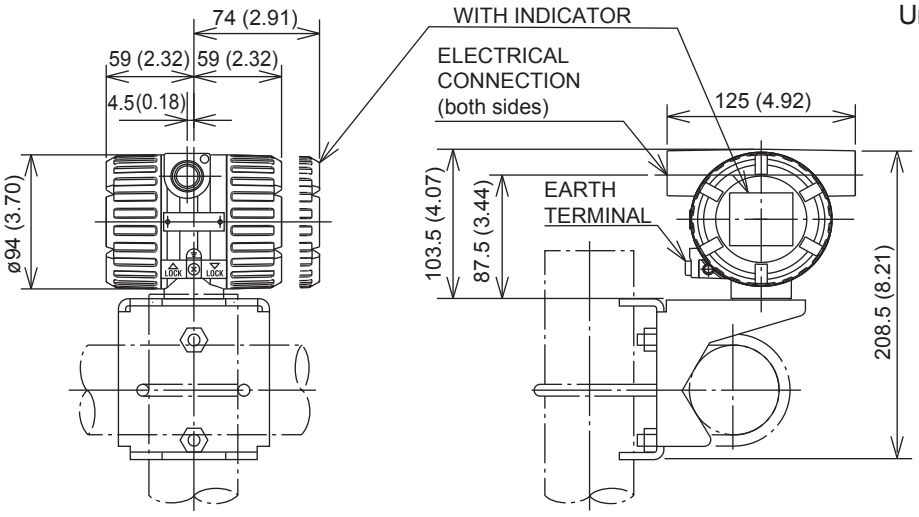
Unit : mm
(approx. inch)



TYPE	REMOTE																							
MODEL CODE	DY040/R2/E1				DY050/R2/E1				DY080/R2/E1				DY100/R2/E1				DY150/R2/E1				DY200/R2/E1			
PROCESS CONNECTION	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2
L	150 (5.91)				170 (6.69)				200 (7.87)				220 (8.66)				270 (10.63)				310 (12.20)			
C	39.7 (1.56)				51.1 (2.01)				71 (2.79)				93.8 (3.69)				138.8 (5.46)				185.6 (7.30)			
CS	14.6 (0.57)				25.7 (1.01)				39.7 (1.56)				51.1 (2.01)				71 (2.79)				93.8 (3.69)			
D	140 (5.51)	140 (5.51)	127 (4.94)	155.4 (6.12)	155 (6.10)	155 (6.10)	152.4 (6.00)	165.1 (6.50)	185 (7.28)	200 (7.87)	190.5 (7.50)	209.6 (8.25)	210 (8.27)	225 (8.86)	228.6 (9.00)	254 (10.00)	280 (11.02)	305 (12.01)	279.4 (11.00)	317.5 (12.50)	330 (12.99)	350 (13.78)	342.9 (13.50)	381 (15.00)
H	288 (11.34)	288 (11.34)	281.5 (11.08)	295.7 (11.64)	297.5 (11.71)	297.5 (11.71)	296.2 (11.66)	302.5 (11.91)	319.5 (12.58)	327 (12.87)	322.5 (12.70)	331.8 (13.06)	354 (13.94)	361.5 (14.23)	363.3 (14.30)	376 (14.80)	406 (15.98)	418.5 (16.48)	405.7 (15.97)	424.5 (16.71)	446 (17.56)	456 (17.95)	452.5 (17.82)	471.5 (18.56)
H1	127 (5.00)				129 (5.07)				136 (5.35)				158 (6.22)				175 (6.89)				190 (7.48)			
T	16 (0.63)	18 (0.71)	17.5 (0.69)	20.6 (0.81)	16 (0.63)	18 (0.71)	19.1 (0.75)	22.4 (0.88)	18 (0.71)	22 (0.87)	23.9 (0.94)	28.4 (1.11)	18 (0.71)	24 (0.94)	23.9 (0.94)	31.8 (1.25)	22 (0.87)	28 (1.10)	25.4 (1.00)	36.6 (1.44)	22 (0.87)	30 (1.18)	28.4 (1.11)	41.1 (1.62)
J	105 (4.13)	105 (4.13)	98.6 (3.88)	114.3 (4.50)	120 (4.72)	120 (4.72)	120.7 (4.75)	127 (5.00)	150 (5.91)	160 (6.30)	152.4 (6.00)	168.2 (6.62)	175 (6.89)	185 (7.28)	190.5 (7.50)	200.2 (7.88)	240 (9.45)	260 (10.24)	241.3 (9.50)	269.7 (10.62)	290 (11.42)	305 (12.01)	298.5 (11.75)	330.2 (13.00)
N	4				4	8	4	8	8	8	4	8	8				8	12	8	12	12	12	8	12
G	19 (0.75)	19 (0.75)	15.7 (0.62)	22.4 (0.88)	19 (0.75)				19 (0.75)	23 (0.91)	19 (0.75)	22.4 (0.88)	19 (0.75)	23 (0.91)	19 (0.75)	22.4 (0.88)	23 (0.91)	25 (0.98)	22.4 (0.88)	22.4 (0.88)	23 (0.91)	25 (0.98)	22.4 (0.88)	25.4 (1.00)
WEIGHT kg (lb)	7.8 (17.2)	8 (17.6)	7.7 (17.1)	8.9 (20.0)	10.1 (22.3)	10.6 (23.4)	10.7 (23.6)	12.2 (26.9)	13.7 (30.2)	16.3 (36.0)	16.3 (36.0)	20.1 (44.3)	21 (46.3)	25 (55.1)	25.6 (56.4)	34.1 (75.2)	40.4 (89.1)	50.4 (111.1)	43.4 (95.7)	61.4 (135.4)	62 (136.7)	69 (152.1)	72 (158.7)	97 (213.8)

(Note 1) The flow direction is opposite (right to left when facing onto indicator) in case of code/CRC.

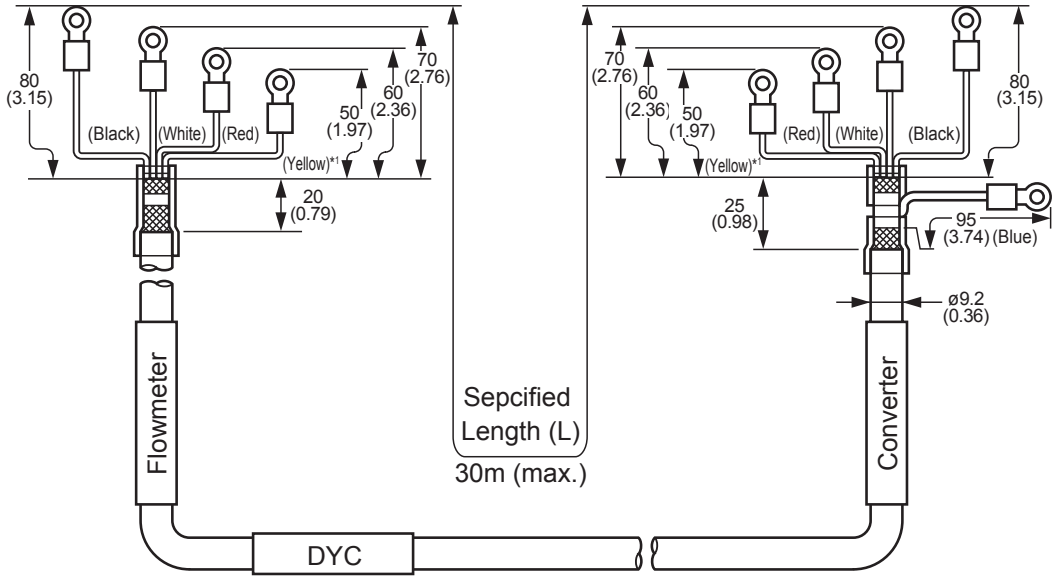
■ Remote Type Converter (DYA)



Unit : mm
(approx. inch)

Weight: 1.9 kg (4.19lb), 4.1 kg (9.04lb) for /E1.
Note: For flowmeters with indicator, add 0.2 kg.(0.44lb), 0.3 kg (0.66lb) for /E1.

■ Signal Cable for Remote Type (DYC)



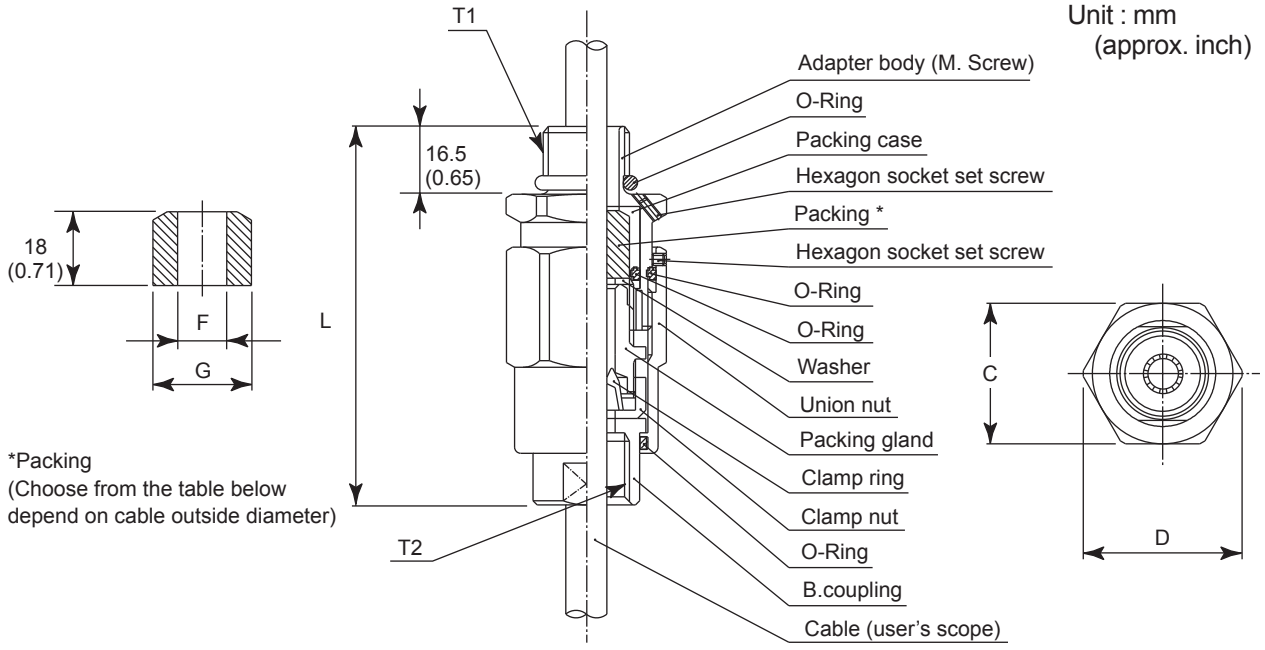
Cable Color and Terminal

Color	Terminal	
	Flow meter	Converter
Yellow (*1)	T	T
Red	A	A
White	B	B
Black	⏚	C
Blue		⏚

(*1) Only for /MV

■ Flameproof Packing Adapter (/G11, /G12)

Unit : mm
(approx. inch)



*Packing
(Choose from the table below depend on cable outside diameter)

Size					Cable outer diameter	Packing dimensions		Identification mark	Weight kg (lb)
T1	T2	C	D	L		F	G		
G 1/2	G 1/2	35 (1.38)	39 (1.54)	94.5 (3.72)	ø8.0 to ø10.0 (ø0.31 to ø0.39)	ø10.0 (ø0.39)	ø20.0 (ø0.79)	16 8-10	0.26 (0.57)
					ø10.0 to ø12.0 (ø0.39 to ø0.47)	ø12.0 (ø0.47)		16 10-12	

14. EXPLOSION PROTECTED TYPE INSTRUMENT

In this chapter, further requirements and differences for explosion proof type instrument are described except TIIS Flame proof. For explosion protected type, the description in this chapter is prior to other description in this User's Manual.

WARNING

- Only trained persons use this instrument in industrial locations.

14.1 ATEX

WARNING

- Only trained persons use this instrument in industrial locations.
- Electrostatic charge may cause an explosion hazard.
  Avoid any actions that cause the generation of electrostatic charge, such as rubbing with a dry cloth on coating face of product.

(1) Technical Data

- **Flameproof**

Applicable Standard : EN 60079-0: 2009,
EN 60079-1: 2007
Certificate : DEKRA 11ATEX0212X
Type of Protection:
Groups/Category: II 2 G
Ex d IIC T6…T1 Gb (Integral Type Vortex Flowmeter and Remote Type Vortex Flow Detector)
Ex d IIC T6 Gb (Remote Type Vortex Flow Converter)
Specification of Protection:
Process Temperature: (Integral Type Vortex Flowmeter and Remote Type Vortex Flow Detector)

Temperature Class	Process Temperature
T6	-29°C to +80°C
T5	-29°C to +100°C
T4	-29°C to +135°C
T3	-29°C to +200°C
T2	-29°C to +300°C
T1	-29°C to +450°C

*1 Note: Use /HT version above 250°C

Temperature Class: T6 (Remote Type Vortex Flow Converter)
Ambient Temperature:
-29 to +60°C (Integral Type Vortex Flowmeter and Remote Type Vortex Flow Detector)
-40 to +60°C (Remote Type Vortex Flow Converter without indicator)
-30 to +60°C (Remote Type Vortex Flow Converter with indicator)
Power Supply: 10.5 to 42Vdc max.
Output Signal: Current Output; 4 to 20mAdc
Pulse Output; On=2Vdc, 200mA
Off=42Vdc, 4mA
Special Fastener: Class A2-50 or more

- **Intrinsically Safe**

Applicable Standard: EN 60079-0: 2009,
EN 60079-0: 2012,
EN 60079-11: 2012,
EN 60079-26: 2007
Certificate: DEKRA 13ATEX0192 X
Type of protection:
Ex ia IIC T4…T1 Ga (Integral Type Vortex Flowmeter)
Ex ia IIC T6…T1 Ga (Remote Type Vortex Flow Detector)
Ex ia IIC T4 Ga (Remote Type Vortex Flow Converter)
Groups/Category: II 1 G
Ambient Temperature:
-29 to +60°C (Integral Type Vortex Flowmeter)
-40 to +80 [79]°C (Remote Type Vortex Flow Detector)
(Option /LT below -29°C, [ ] for Option /MV at T6)
-40 to +80°C (Remote Type Vortex Flow Converter without indicator)
-30 to +80°C (Remote Type Vortex Flow Converter with indicator)

(Integral Type Vortex Flowmeter)

Temperature Class	Process Temperature
T4	-29°C to +135°C
T3	-29°C to +199°C
T2	-29°C to +250°C
T1	–29°C to +250°C

(Remote Type Vortex Flow Detector)

Temperature Class	Process Temperature *
T6	–196°C to +84/[+79]°C
T5	–196°C to +100°C
T4	–196°C to +135°C
T3	–196°C to +199°C
T2	–196°C to +299/[+289]°C
T1	–196°C to +449/[+439]°C

*: Use /HT option above 250°C, use /LT option below -29°C, [ ] for /MV option.

Electrical data:
Supply and Output Circuit
(SUPPLY + and -, PULSE + and -);
Maximum Input Voltage Ui: 30Vdc
Maximum Input Current Ii: 300mA
(Refer to Contact rating for pulse output.)
Maximum Input Power Pi: 0.9 W
Internal Capacitance Ci: 14nF
Internal Inductance Li: 0mH
Electrical Connection: ANSI 1/2 NPT female,
ISO M20 X 1.5 female

Special conditions for safe use

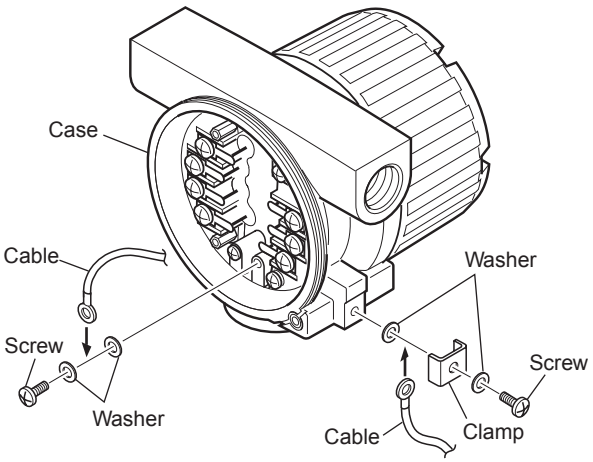
- Precautions shall be taken to minimize the risk from electrostatic discharge of painted parts.
- When the enclosure of the flow meter or the flow converter are made of aluminum, if it is mounted in an area where the use of EPL Ga equipment is required, it must be installed such that, even in the event of rare incidents, ignition sources due to impact and friction sparks are excluded.
- The dielectric strength of at least 500 V a.c. r.m.s. between the intrinsically safe circuits and the enclosure of the flow meter or the converter is limited only by the overvoltage protection.

(2) Installation

WARNING

- All wiring shall comply with local installation requirements and local electrical code.
- Use the suitable heat-resisting cables (over 90°C) for the digitalYEWFLO Model DY Series Vortex Flowmeter when the ambient temperature exceeds 60°C and/or the process temperature exceeds 200°C.
- Cable glands and adapters shall be of Ex “d” for Ex “d” installations.
- Cable glands and adapters shall be installed so as to maintain the specified degree of protection (IP Code) of the flowmeter.

The grounding terminals are located on the inside and outside of the terminal area.
Connect the cable to grounding terminal in accordance with wiring procedure (1) or (2).



(1) Internal grounding terminal (2) External grounding terminal
F1401.ai

Figure 14.1 Wiring Procedure for Grounding Terminals

(3) Operation

WARNING

- Wait 3 min. after power is turned off, before opening the covers.
- Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.

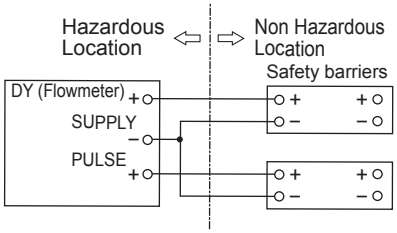
(4) Maintenance and Repair

WARNING

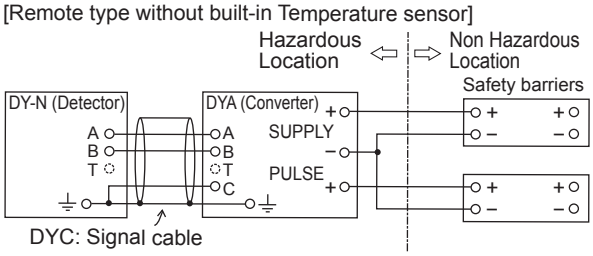
- The instrument modification or parts replacement by other than authorized representative of Yokogawa Electric Corporation is prohibited and will void the certification.

(5) Installation Diagram of Intrinsically safe (and Note)

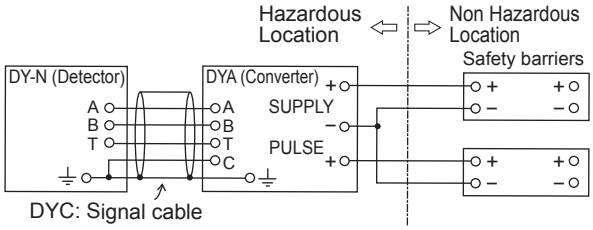
[Integral type]



[Remote type without built-in Temperature sensor]



[Remote type with built-in Temperature sensor]



Electrical data:
Signal/Supply Circuit (Terminals SUPPLY + and –):
Ui = 30 V, Ii = 300 mA, Pi = 0.9 W (linear source),
Ci = 14 nF, Li = 0 mH
Pulse Circuit (Terminals PULSE + and –):
Ui = 30 V, Ii = 300 mA*, Pi = 0.9 W (linear source),
Ci = 14 nF, Li = 0 mH
*: Refer to “Contact rating” for the maximum current value of Pulse Circuit

Note:
- It shall be assured that the voltage difference between the output circuits of the associated apparatus (safety barriers) is not more than 30V.
- Cables for the connection for Signal/Supply Circuit and Pulse Circuit shall be of Type A or B in accordance with EN 60079-14, otherwise the sum of Io of the associated apparatus (safety barriers) shall be not more than 300 mA.

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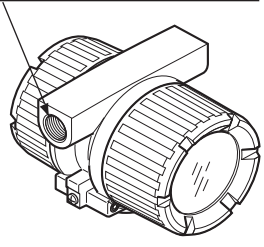
(6) Electrical Connection

The type of electrical connection is stamped near the electrical connection port according to the following codes.

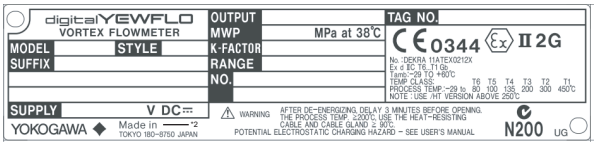
Screw size	Marking
ISO M20 X 1.5 female	⚠ M
ANSI 1/2-14NPT female	⚠ N



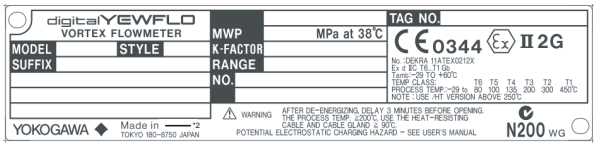
F1403.ai

(7) Name Plate

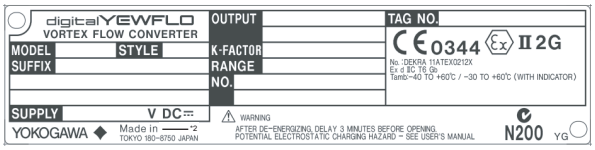
[Integral type, Flameproof]



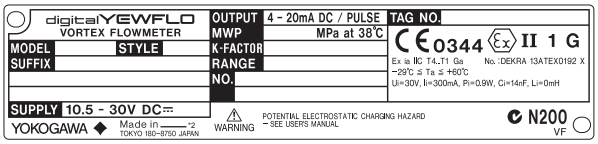
[Remote type detector, Flameproof]



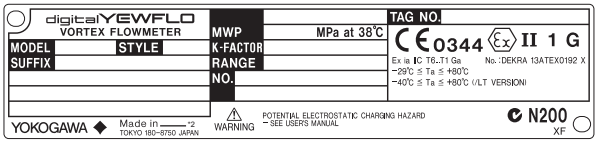
[Remote type converter, Flameproof]



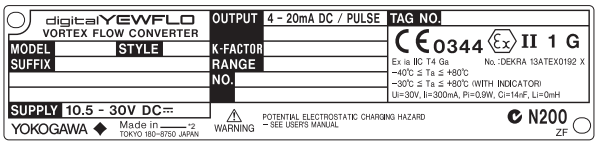
[Integral type, Intrinsically safe]



[Remote type detector, Intrinsically safe]



[Remote type converter, Intrinsically safe]



MODEL: Specified model code
SUFFIX : Specified suffix code
STYLE: Style code
SUPPLY : Supply voltage
OUTPUT : Output signal
MWP : Maximum working pressure
K-FACTOR : Device-specific factor
RANGE: Specified range
NO.: Upper column: Manufacturing serial number *1
Lower column: The year of production
TAG NO. : Specified TAG No.
CE: CE marking
0344: The indentification number of the notified body.
II1G: Group II Category 1 Gas atmosphere
II2G: Group II Category 2 Gas atmosphere
II3G: Group II Category 3 Gas atmosphere

*1) The first number in the second block of “NO.” column is the last one number of the production year. For example, the year of production of the product engraved as follows is year 2014.
NO. S5K965926 4̲35 7
↑Produced in 2014
*2) The product - producing country

14.2 FM

(1) Technical Data

- **Explosion Proof**

Applicable Standard: FM3600 2011, FM3611 2004, FM3615 2006, FM3810 1989, Including Supplement 1 1995, ANSI/NEMA 250 1991
Type of Protection:
Explosionproof for Class I, Division 1, Groups A,B, C and D;
Dust-ignition proof for Class II/III, Division 1, Groups E, F,and G.

"SEAL ALL CONDUITS 18 INCHES."
"WHEN INSTALLED IN DIV.2, SEALS NOT REQUIRED"

Enclosure Rating: Type 4X
Temperature Code: T6
Ambient Temperature:
-29 to 60°C (Integral Type Vortex Flowmeter and Remote Type Vortex Flow Detector)
-40 to 60°C (Remote Type Vortex Flow Converter)
Power Supply: 42Vdc max. (Integral Type Vortex Flowmeter and Remote Type Vortex Flow Detector)
Output Signal (Integral Type Vortex Flowmeter):
Current Output; 4 to 20mAdc
Pulse Output; On=2Vdc, 200mA
Off=42Vdc, 4mA
Output Signal (Remote Type Vortex Flow Detector):
Output Signal to Converter; 30Vp-p, 100μAp-p
Input/Output Signal (Remote Type Vortex Flow Converter): Current Output; 4 to 20mAdc
Pulse Output; On=2Vdc, 200mA
Off=42Vdc, 4mA
Input Signal from Flowmeter; 30Vp-p, 100μAp-p
Electrical connection : ANSI 1/2 NPT female (Special)

- **Intrinsically Safe**

Applicable Standard: FM3600 1998, FM3610 2010, FM3611 2004, FM3810 2005, NEMA 250 1991, ANSI/ISA-60079-0: 2009, ANSI/ISA-60079-11: 2009
Type of Protection:
Intrinsically safe for Class I, II, III, Div.1, Groups A, B, C, D, E, F and G,T4 and Class I, Zone 0, AEx ia IIC T4 Nonincendive for Class I, II, Div. 2, Groups A, B, C, D, F and G, Class III,Div.1, T4, and Class I, Zone 2, Group IIC, T4
Ambient Temperature:
–29 to +60°C (Integral Type Vortex Flowmeter)
–29 to +80°C (Remote Type Vortex Flow Detector)
–40 to +60°C (Remote Type Vortex Flow Converter)
Indoors and Outdoors: Type 4X
Electrical Parameters: Vmax=30Vdc, Imax=165mAdc, Pi=0.9W, Ci=12nF, Li=0.15mH
Electrical connection : ANSI 1/2 NPT female

(2) Wiring

- **Explosion proof**

WARNING

- All wiring shall comply with National Electrical Code ANSI/NFPA 70 and Local Electrical Code.
- "SEAL ALL CONDUITS 18 INCHES" "WHEN INSTALLED DIV.2, SEALS NOT REQUIRED".

- **Intrinsically Safe**

NOTE

- The FM Approved Hand Held Communicator may be connected at any point in the loop between the digitalYEWFLO and the Control Equipment.

(3) Operation

- **Explosion proof**

WARNING

- Note a warning label worded as follows.
  Warning: OPEN CIRCUIT BEFORE
  REMOVING COVER.
  INSTALL IN ACCORDANCE WITH
  THE INSTRUCTION MANUAL (IM)
  IF6A1-01E.
- Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.

(4) Maintenance and Repair

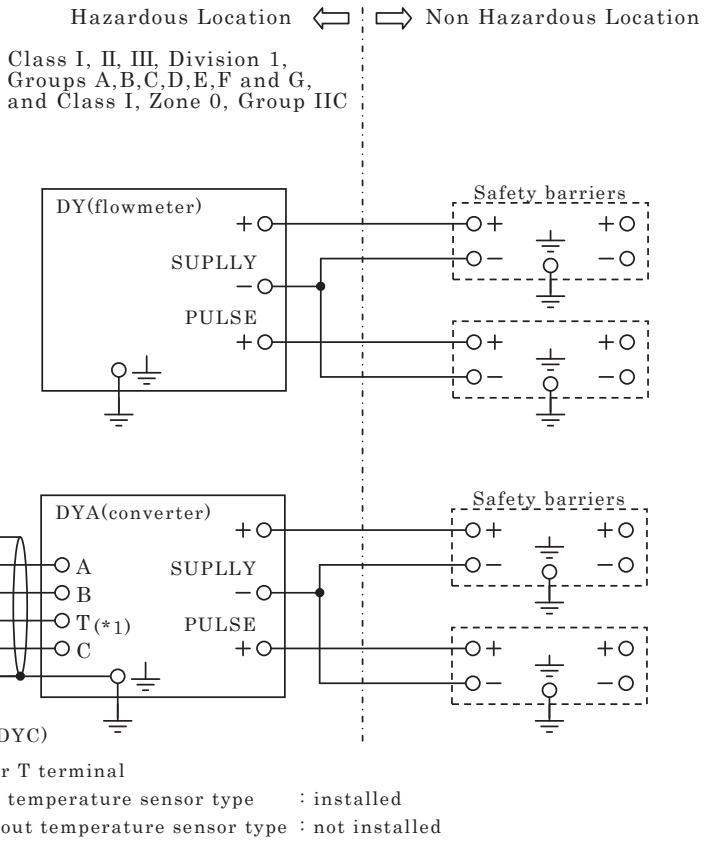
WARNING

- The instrument modification or part replacements by other than authorized representative of Yokogawa Electric Corporation is prohibited and will void the approval of FM Approvals.

(5) Control Drawing

Model: DY Series Date: April 16, 2001

12. Drawings
12.1 Installation Diagram



Electrical parameters of vortex flowmeter(DY) and vortex flow converter(DYA).
Vmax=30 V Imax=165mA Pi=0.9W
Ci=12nF Li=0.15mH

Installation requirements between flowmeter, converter and Safety Barrier
Rev1 Vt or Voc≦Vmax It or Isc≦Imax Po≦Pi
Ca≧Ci + Ccable La≧Li+Lcable
Vt, Voc, It, Isc, Po, Ca and La are parameters of safety barrier.

Note :
1. In any safety barrier used output current must be limited by a resistor 'R' such that Isc=Voc/R.
Rev2 2. Any Single FM Approved Barrier of multiple barriers FM Approved for this configuration who' s parameters meet the above installation requirements.
3. Input voltage of the safety barrier must be less than 250Vrms/Vdc.
Rev2 4. Installation should be in accordance with National Electrical Code, ANSI/ NFPA 70.
5. Dust-tight conduit seal must be used when installed in class II and III environments.
6. Do not alter drawing without authorization from FM.

Rev.1 :October 19, 2001 Y. Yamamoto
Rev.2 :November 5, 2001 Y.Yamamoto

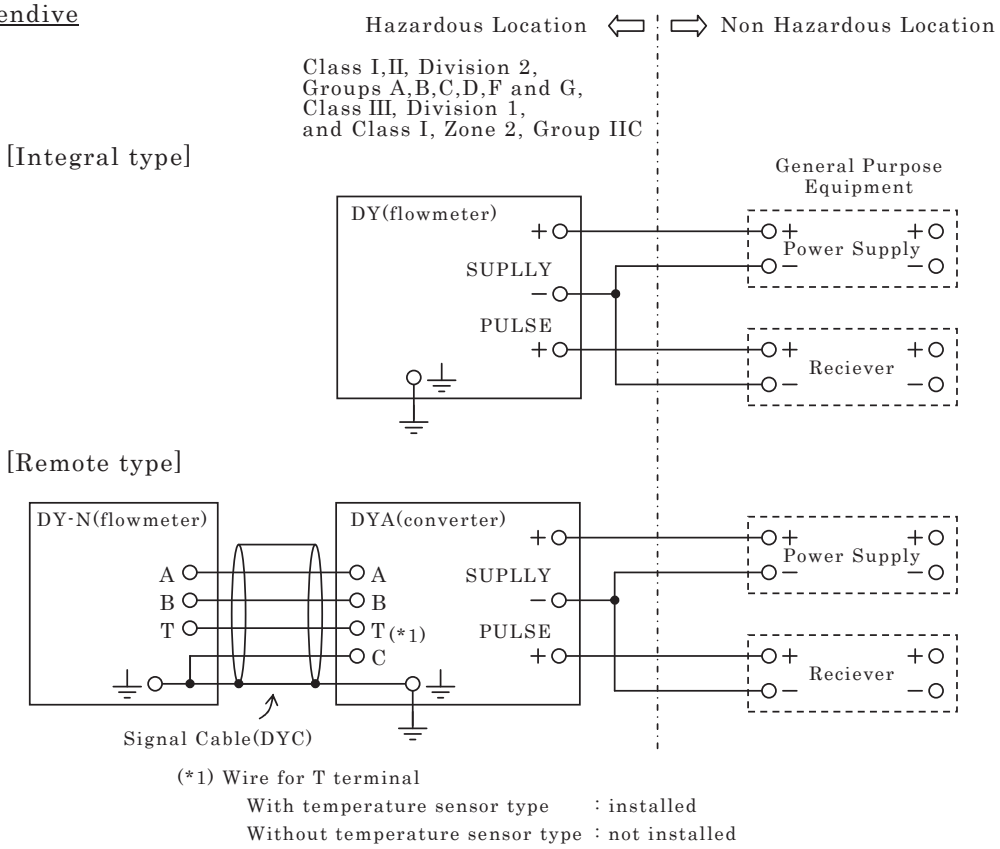
Doc. No.: IFM019-A12 P.1
Drawing: Y. Yamamoto
Approved: K. Ichikawa

Yokogawa Electric Corporation

IFM019

Model: DY Series Date: April 16, 2001

Nonincendive



(*1) Wire for T terminal
With temperature sensor type : installed
Without temperature sensor type : not installed

Non-incendive field wire parameters of voltex flowmeter(DY) and vortex flow converter(DYA).

Vmax=30 V Imax=165mA Pi=0.9W
Ci=12nF Li=0.15mH

Installation requirements between flowmeter, converter and general purpose equipment.

Rev1 Vt or Voc ≦ Vmax It or Isc ≦ Imax Po ≦ Pi
Ca ≧ Ci + Ccable La ≧ Li+Lcable

Vt, Voc, It, Isc, Po, Ca and La are nonincendive field wire parameters of general purpose equipment.

Note :

Rev2 1. The general purpose equipment must be FM Approved with Nonincendive field wiring parameter which meet the above installation requirements.
Rev2 2. Installation should be in accordance with National Electric Code, ANSI/ NFPA 70.
3. Dust-tight conduit seal must be used when installed in class II and III environments.
4. Do not alter drawing without authorization from FM.

Rev.1 :October 19, 2001 Y. Yamamoto
Rev.2 :November 5, 2001 Y.Yamamoto

Doc. No.: IFM019-A12 P.2
Drawing: Y. Yamamoto
Approved: K. Ichikawa

Yokogawa Electric Corporation

IFM019

14.3 IECEx

WARNING

- Only trained persons use this instrument in industrial locations.
- Electrostatic charge may cause an explosion hazard.
  Avoid any actions that cause the generation of electrostatic charge, such as rubbing with a dry cloth on coating face of product.

(1) Technical Data

- **Flameproof**

Applicable Standard : IEC 60079-0: 2007,
IEC 60079-1: 2007
Certificate : IECEx DEK 11.0077X
Type of Protection:
Ex d IIC T6…T1 Gb (Integral Type Vortex Flowmeter and Remote Type Vortex Flow Detector)
Ex d IIC T6 Gb (Remote Type Vortex Flow Converter)
Specification of Protection:
Process Temperature: (Integral Type Vortex Flowmeter and Remote Type Vortex Flow Detector)

Temperature Class	Process Temperature
T6	-29°C to +80°C
T5	-29°C to +100°C
T4	-29°C to +135°C
T3	-29°C to +200°C
T2	-29°C to +300°C
T1	-29°C to +450°C

*1 Note: Use /HT version above 250°C

Temperature Class: T6 (Remote Type Vortex Flow Converter)
Ambient Temperature:
–29 to +60°C (Integral Type Vortex Flowmeter and Remote Type Vortex Flow Detector)
–40 to +60°C (Remote Type Vortex Flow Converter without indicator)
–30 to +60°C (Remote Type Vortex Flow Converter with indicator)
Power Supply: 10.5 to 42Vdc max.
Output Signal: Current Output; 4 to 20mAdc
Pulse output; On=2Vdc, 200mA
Off=42Vdc, 4mA
Special Fastener: Class A2-50 or more

- **Intrinsically Safe**

Applicable Standard: IEC 60079-0: 2011,
IEC 60079-11: 2011,
IEC 60079-26: 2006
Certificate: IECEx DEK 13.0066X
Type of protection:
Ex ia IIC T4…T1 Ga (Integral Type Vortex Flowmeter)
Ex ia IIC T6…T1 Ga (Remote Type Vortex Flow Detector)
Ex ia IIC T4 Ga (Remote Type Vortex Flow Converter)
Ambient Temperature:
-29 to +60°C (Integral Type Vortex Flowmeter)
-40 to +80 [79]°C (Remote Type Vortex Flow Detector)
(Option /LT below -29°C, [ ] for Option /MV at T6)
-40 to +80°C (Remote Type Vortex Flow Converter without indicator)
-30 to +80°C (Remote Type Vortex Flow Converter with indicator)
(Integral Type Vortex Flowmeter)

Temperature Class	Process Temperature
T4	-29°C to +135°C
T3	-29°C to +199°C
T2	-29°C to +250°C
T1	-29°C to +250°C

(Remote Type Vortex Flow Detector)

Temperature Class	Process Temperature *
T6	-196°C to +84/[+79]°C
T5	-196°C to +100°C
T4	-196°C to +135°C
T3	-196°C to +199°C
T2	-196°C to +299/[+289]°C
T1	-196°C to +449/[+439]°C

*: Use /HT option above 250°C, use /LT option below -29°C, [ ] for /MV option.

Electrical data:
Supply and Output Circuit
(SUPPLY + and -, PULSE + and -);
Maximum Input Voltage Ui: 30 V dc
Maximum Input Current Ii: 300 mA
(Refer to Contact rating for pulse output.)
Maximum Input Power Pi: 0.9 W
Internal Capacitance Ci: 14nF
Internal Inductance Li: 0mH
Electrical Connection: ANSI 1/2 NPT female,
ISO M20 X 1.5 female

Special conditions for safe use

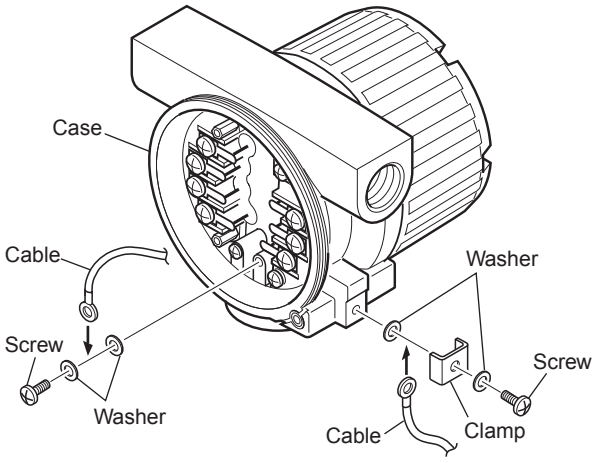
- Precautions shall be taken to minimize the risk from electrostatic discharge of painted parts.
- When the enclosure of the flow meter or the flow converter are made of aluminum, if it is mounted in an area where the use of EPL Ga equipment is required, it must be installed such that, even in the event of rare incidents, ignition sources due to impact and friction sparks are excluded.
- The dielectric strength of at least 500 V a.c. r.m.s. between the intrinsically safe circuits and the enclosure of the flow meter or the converter is limited only by the overvoltage protection.

(2) Installation

WARNING

- All wiring shall comply with local installation requirements and local electrical code.
- Use the suitable heat-resisting cables (over 90°C) for the digitalYEWFLO Model DY Series Vortex Flowmeter when the ambient temperature exceeds 60°C and/or the process temperature exceeds 200°C.
- Cable gland and adapters shall be of Ex “d” for Ex “d” installations.
- Cable gland and adapters shall be installed so as to maintain the specified degree of protection (IP Code) of the flowmeter.

The grounding terminals are located on the inside and outside of the terminal area.
Connect the cable to grounding terminal in accordance with wiring procedure (1) or (2).



(1) Internal grounding terminal (2) External grounding terminal
F1406.ai

Figure 14.2 Wiring Procedure for Grounding Terminals

(3) Operation

WARNING

- Wait 3 min. after power is turned off, before opening the covers.
- Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.

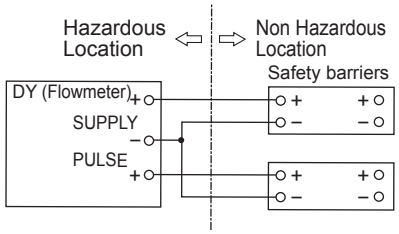
(4) Maintenance and Repair

WARNING

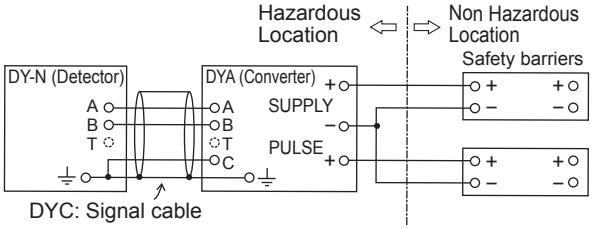
- The instrument modification or parts replacement by other than authorized representative of Yokogawa Electric Corporation is prohibited and will void the certification.

(5) Installation Diagram of Intrinsically safe (and Note)

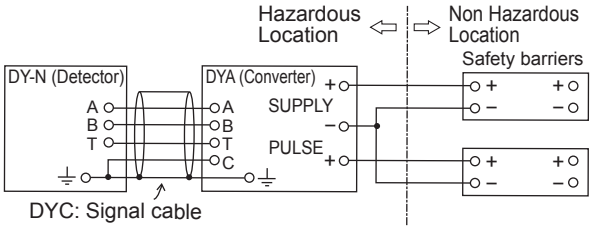
[Integral type]



[Remote type without built-in Temperature sensor]



[Remote type with built-in Temperature sensor]



Electrical data:
Signal/Supply Circuit (Terminals SUPPLY + and –):
Ui = 30 V, Ii = 300 mA, Pi = 0.9 W (linear source),
Ci = 14 nF, Li = 0 mH
Pulse Circuit (Terminals PULSE + and –):
Ui = 30 V, Ii = 300 mA*, Pi = 0.9 W (linear source),
Ci = 14 nF, Li = 0 mH
*: Refer to “Contact rating” for the maximum current value of Pulse Circuit

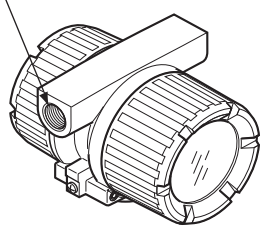
Note:
- It shall be assured that the voltage difference between the output circuits of the associated apparatus (safety barriers) is not more than 30V.
- Cables for the connection for Signal/Supply Circuit and Pulse Circuit shall be of Type A or B in accordance with IEC 60079-14, otherwise the sum of Io of the associated apparatus (safety barriers) shall be not more than 300 mA.

F1402.ai

(6) Electrical Connection

The type of electrical connection is stamped near the electrical connection port according to the following codes.

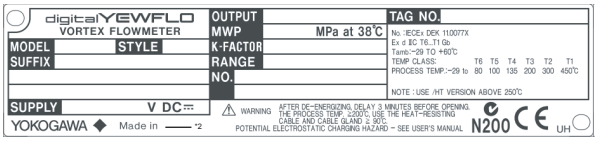
Screw size	Marking
ISO M20 X 1.5 female	⚠ M
ANSI 1/2-14NPT female	⚠ N



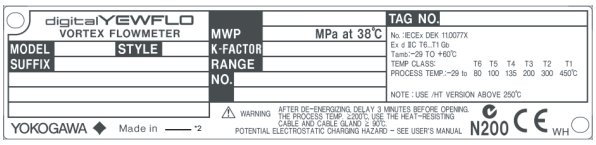
F1408.ai

(7) Name Plate

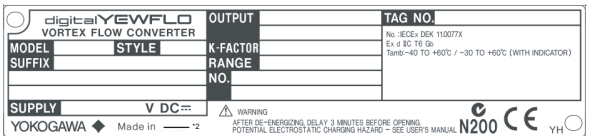
[Integral type, Flameproof]



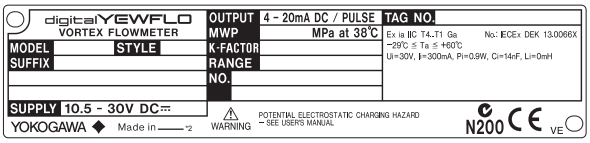
[Remote type detector, Flameproof]



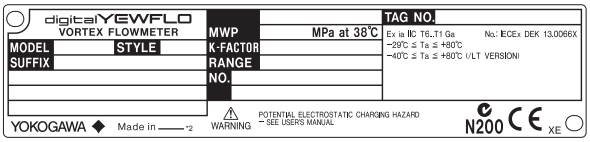
[Remote type converter, Flameproof]



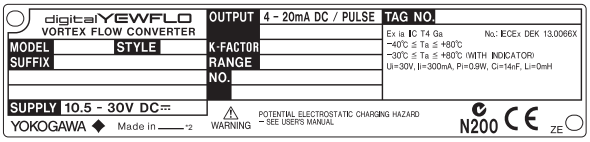
[Integral type, Intrinsically safe]



[Remote type detector, Intrinsically safe]



[Remote type converter, Intrinsically safe]



MODEL: Specified model code
SUFFIX : Specified suffix code
STYLE: Style code
SUPPLY : Supply voltage
OUTPUT : Output signal
MWP : Maximum working pressure
K-FACTOR : Device-specific factor
RANGE: Specified range
NO.: Upper column: Manufacturing serial number *1
Lower column: The year of production
TAG NO. : Specified TAG No.
CE: CE marking
II1G: Group II Category 1 Gas atmosphere
II2G: Group II Category 2 Gas atmosphere
II3G: Group II Category 3 Gas atmosphere

*1) The first number in the second block of “NO.” column is the last one number of the production year. For example, the year of production of the product engraved as follows is year 2014.
NO. S5K965926 4̲35 7
↑Produced in 2014
*2) The product - producing country

14.4 CSA

(1) Technical Data

- **Explosion Proof**

Applicable Standard: C22.1-98, C22.2 No.0-M1991, C22.2 No.0.4-04, C22.2 No.0.5-1982, C22.2 No. 25-1966, C22.2 No. 30-M1986, C22.2 No. 94-M1991, C22.2 No. 142-M1987, C22.2 No. 61010-1-04, ANSI/ISA-12.27.01-2003

Certificate: 1166201

Type of Protection:

Explosionproof for Class I, B, C and D; Class II, Groups E, F and G; Class III.

For Class I, Division 2 location:

"FACTORY SEALED, CONDUIT SEAL NOT REQUIRED."

Enclosure : Type 4X

(Integral Type Vortex Flowmeter and Remote Type Vortex Flow Detector)

Temperature Code	Ambient Temperature	Process Temperature
T6	60°C	≤85°C
T5	60°C	≤100°C
T4	60°C	≤135°C
T3	60°C	≤200°C
T2	60°C	≤300°C
T1	60°C	≤450°C

Temperature Code: T6 (Remote Type Vortex Flow Converter)

Ambient Temperature:

-29 to +60°C (Integral Type Vortex Flowmeter and Remote Type Vortex Flow Detector)

-40 to +60°C (Remote Type Vortex Flow Converter)

Power Supply: 42Vdc max. (Integral Type Vortex Flowmeter and Remote Type Vortex Flow Converter)

Output Supply (Integral Type Vortex Flowmeter): Current Output; 4 to 20mAdc

Pulse Output; On=2Vdc, 200mA

Off=42Vdc, 4mA

Output Signal (Remote Type Vortex Flow Detector): Output Signal; 30Vp-p, 100μAp-p

Input/Output signal (Remote Type Vortex Flow Converter): Current Output; 4 to 20mAdc

Pulse; On=2Vdc, 20mA

Off=42Vdc, 4mA

Input Signal; 30Vp-p, 100μAp-p

Electrical Connection: ANSI 1/2 female (Special)

- **Intrinsically Safe**

Type "n" and Non-incendive

Applicable Standard: C22.2 No. 0-M91, C22.2 No. 0.4-2004, C22.2 No. 157-M1987, C22.2 No. 213-M1987, C22.2 No. 1010.1-92, CAN/CSA-E60079-0:02, CAN/CSA-E60079-11:02, CAN/CSA-E60079-15:02, ANSI/ ISA-12.27.01-2003

Certificate: 1198227

Type of Protection:

Ex ia IIC T4...T1 and Ex nC IIC T4...T1 (Integral Type Vortex Flowmeter and Remote Type Vortex Flow Detector)

Ex ia IIC T4 and Ex nC IIC T4 (Remote Type Vortex Flow Converter)

(Integral Type Flowmeter and Remote Type Vortex Flow Detector)

Temperature Code	Ambient Temperature	Process Temperature
T4	60°C	≤135°C
T3	60°C	≤200°C
T2	60°C	≤300°C
T1	60°C	≤450°C

Ambient Temperature:

-29 to +60°C (Integral Type Vortex Flowmeter and Remote Type Vortex Flow Detector)

-40 to +60°C (Remote Type Vortex Flow Converter)

Degree of Protection of Enclosure: IP67

Electrical Parameters: Ui=30Vdc, Ii=165mAdc, Pi=0.9W

Ci=12nF, Li=0.15mH

Electrical Connection: ANSI 1/2 NPT female

Type of Protection:

Intrinsically Safe for Class I,II,III, Div.1, Groups A,B,C,D,E,F and G, Non- incendive for Class I,II, Div.2, Groups A,B,C,D,E,F and G, Class III, Div.1

(Integral Type Vortex Flowmeter and Remote Type Vortex Flow Detector)

Temperature Code	Ambient Temperature	Process Temperature
T4	60°C	≤135°C
T3	60°C	≤200°C
T2	60°C	≤300°C
T1	60°C	≤450°C

Temperature Code: T4 (Remote Type Vortex Flow Converter)

Ambient Temperature: -40 to 60°C

Enclosure: Type 4X

Electrical Parameters: Vmax=30Vdc, Imax=165mAdc, Pmax=0.9W, Ci=12nF, Li=0.15mH

(2) Wiring

- **Explosion proof**

WARNING

- All wiring shall comply with Canadian Electrical Code Part I and Local Electrical Codes.
- In Hazardous locations, wiring shall be in conduit as shown in the figure.
- A SEAL SHALL BE INSTALLED WITHIN 50cm OF THE ENCLOSURE.
- When the equipment is installed in Division 2, “FACTORY SEALED, CONDUIT SEAL NOT REQUIRED”.

(3) Operation

- **Explosion proof**

WARNING

- Note a warning label worded as follows.
  Warning: OPEN CIRCUIT BEFORE REMOVING COVER.
- Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.

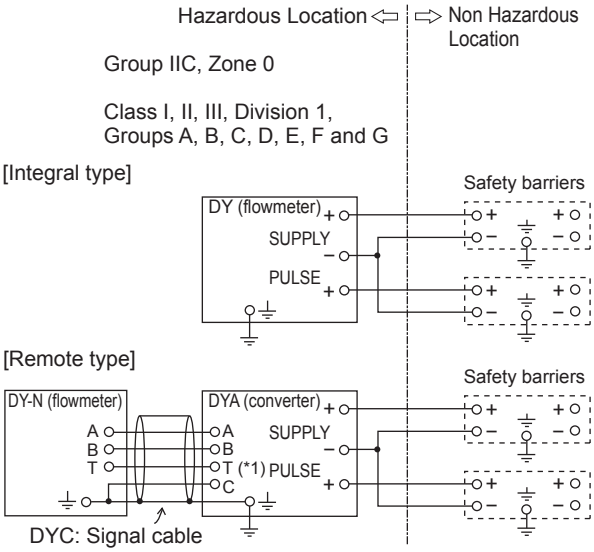
(4) Maintenance and Repair

WARNING

- The instrument modification or part replacements by other than authorized representatives of Yokogawa Electric Corporation are prohibited and will void CSA Certification.

(5) Installation Diagram Intrinsically Safe (and Note)

Intrinsically safe



(*1) Wire for T terminal
With temperature sensor type : installed
Without temperature sensor type: not installed

Electrical parameters of vortex flowmeter (DY) and vortex flow converter (DYA).
Ui (Vmax)=30 V Ii (Imax)=165 mA Pi (Pmax)=0.9W
Ci=12 nF Li=0.15 mH

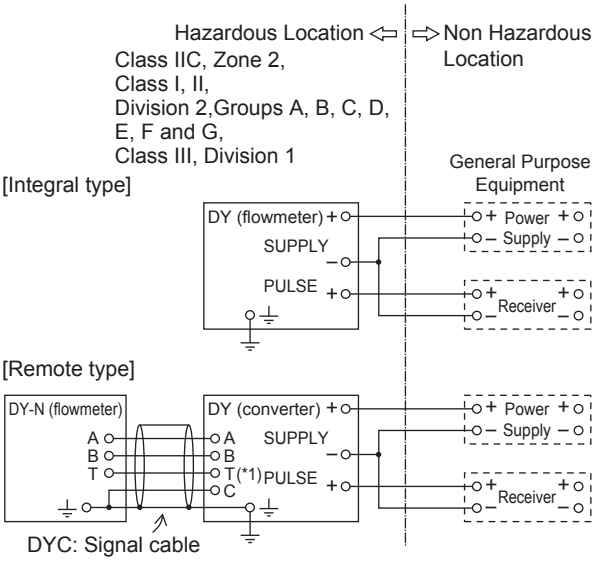
Installation requirements between flowmeter, converter and Safety Barrier
Uo ≤ Ui Io ≤ Ii Po ≤ Pi Co ≥ Ci+Ccable
Lo ≥ Li+Lcable
Voc ≤ Vmax Isc ≥ Imax Ca ≥ Ci+Ccable
La ≥ Li+Lcable
Uo, Io, Po, Co, Lo, Voc, Isc, Ca and La are parameters of barrier.

F1409.ai

WARNING

- In any safety barrier used output current must be limited by a resistor ‘R’ such that Io=Uo/R or Isc=Voc/R.
- The safety barrier must be CSA certified.
- Input voltage of the safety barrier must be less than 250Vrms/Vdc.
- Installation should be in accordance with Canadian Electrical Code Part I.
- Dust-tight conduit seal must be used when installed in class II and III environments.
- Do not alter drawing without authorization from CSA.

Type “n” and Non-incendive



(*1) Wire for T terminal
With temperature sensor type : installed
Without temperature sensor type: not installed

Non-incendive field wire parameters of vortex flowmeter (DY) and vortex flow converter (DYA).
Ui (Vmax)=30 Ii (Imax)=165mA Pi (Pmax)=0.9W
Ci=12nF Li=0.15mH

Installation requirement between flowmeter, converter and general purpose equirement.
Uo ≤ Ui Io ≤ Ii Po ≤ Pi Co ≥ Ci+Ccable
Lo ≥ Li+Lcable
Voc ≤ Vmax Isc ≤ Imax Ca ≥ Ci+Ccable
La ≥ Li+Lcable
Uo, Io, Po, Co Voc, Isc, Ca and La are nonincendive field wire parameters of general purpose equipment.

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WARNING

- The general purpose equipment must be CSA certified as the equipment which have type n or non-incendive field wire parameters.
- Installation should be in accordance with Canadian Electrical Code Part I.
- Dust-tight conduit seal must be used when installed in class II and III environments.
- Do not alter drawing without authorization from CSA.

(6) Dual Seal (Option code: /CF11, /CS11)

Dual Seal:
Certified by CSA to the requirement of ANSI/ISA 12.27.01
No additional sealing required.
Primary seal failure annunciation: at the O-ring seal portion between shedder bar and amplifier housing.

14.5 TIIS

Certificate:

Model	Shedder bar Material	Integral Type Flowmeter		Remote Type Detector
		N (None Indicator)	D (With Indicator)	N (None Indicator)
DY015 DY025/R1 DY040/R2	E	TC14901	TC14912	TC14923
	X	TC18903	TC18914	TC18925
DY025 DY040/R1 DY050/R2	E	TC19504	TC19513	TC19522
	X	TC18904	TC18915	TC18926
DY040 DY050/R1 DY080/R2	E	TC19505	TC19514	TC19523
	X	TC18905	TC18916	TC18927
DY050 DY080/R1 DY100/R2	E	TC19506	TC19515	TC19524
	X	TC18906	TC18917	TC18928
DY080 DY100/R1 DY150/R2	E	TC19507	TC19516	TC19525
	X	TC18907	TC18918	TC18929
DY100 DY150/R1 DY200/R2	E	TC19508	TC19517	TC19526
	X	TC18908	TC18919	TC18930
DY150 DY200/R1	E	TC19509	TC19518	TC19527
	X	TC18909	TC18920	TC18931
DY200	E	TC19510	TC19519	TC19528
	X	TC18910	TC18921	TC18932
DY250	E	TC19511	TC19520	TC19529
DY300	E	TC19512	TC19521	TC19530
DY400	B	TC18945	TC18955	TC18965

Model	Shedder bar Material	Remote Type Converter	
		N (None Indicator)	D (With Indicator)
DYA		TC14934	TC14935

	Integral Type Flowmeter		Remote Type Flowmeter	
	None Indicator	With Indicator	Detector	Converter
Construction	Ex d IIC T6	←	←	←
	Flame Proof Approval	←	←	←
Amb.Temp	-20°C up to 60°C	←	←	←
Rating	Maximum power supply vortage: DC42V Current Signal: DC4-20mA Pulse Signal: ON : 2V 200mA OFF : 42V 4mA		Output Voltage: 30Vp-p Output Current: 100μ Ap-p	Maximum power supply vortage: DC42V Current Signal: DC4-20mA Pulse Signal: ON : 2V 200mA OFF : 42V 4mA Input Signal: 30V p-p,100μ A p-p Resistance Temp, Sensor Input: Pt1000 at 0°C Specified Current: less than 1mA

* In case that ambient temperature exceeds 50°C, use heat-resistant cables with maximum allowable temperature of 70°C or above.

15. PED (PRESSURE EQUIPMENT DIRECTIVE)

This chapter is described further requirements and notices concerning the PED (Pressure Equipment Directive). The description in this chapter is prior to other description in this User's Manual.

(1) Technical Data

Pressure Equipment Directive:

Type of equipment: piping
Type of fluid: liquid and gas
Group of fluid: 1 and 2
Module: H

MODEL	DN(mm)*	PS(MPa)*	PS·DN(MPa·mm)	CATEGORY**
DY015	15	42	630	Article 3, Paragraph 3 (SEP)
DY025	25	42	1050	Article 3, Paragraph 3 (SEP)
DY040	40	42	1680	II
DY050	50	42	2100	II
DY080	80	42	3360	II
DY100	100	42	4200	II
DY150	150	42	6300	III
DY200	200	42	8400	III
DY250	250	42	10500	III
DY300	300	42	12600	III
DY400	400	25	10000	III

* PS: Maximum allowable pressure for Flow tube, DN: Nominal size
** Refered to Table 6 coverd by ANNEX II of EC Directive on Pressure Equipment Directive 97/23/EC

(2) Installation

WARNING

- Please tighten the bolts for piping joint according to the appropriate torgue values.
- Please take measure to protect the flowmeters from forces caused by vibration through piping.

(3) Operation

WARNING

- The temperature and pressure of fluid should be applied under the normal operating condition.
- The ambient temperature should be applied under the normal operating condition.
- Please pay attention to prevent the excessive pressure like water hammer, etc. When water hammer is to be occurred, please take measures to prevent the pressure from exceeding PS (maximum allowable pressure) by setting the safety valve, etc. at the system and the like.
- When external fire is to be occurred, please take safety measures at the device or system not to influence the flowmeters.
- Please pay attention not to abrade the metal pipe, when using the fluid to abrade the metal pipe such as slurry and sand are contained.

INSTALLATION AND OPERATING PRECAUTIONS FOR TIIS FLAMEPROOF EQUIPMENT

Apparatus Certified Under Technical Criteria (IEC-compatible Standards)

1. General

The following describes precautions on electrical apparatus of flameproof construction (hereinafter referred to as flameproof apparatus) in explosion-protected apparatus.
Following the Labour Safety and Health Laws of Japan, flameproof apparatus is subjected to type tests to meet either the technical criteria for explosionproof electrical machinery and equipment (standards notification no. 556 from the Japanese Ministry of Labour) (hereinafter referred to as technical criteria), in conformity with the IEC Standards, or the “Recommended Practice for Explosion-Protected Electrical Installations in General Industries,” published in 1979. These certified apparatus can be used in hazardous locations where explosive or inflammable gases or vapours may be present.
Certified apparatus includes a certification label and an equipment nameplate with the specifications necessary for explosion requirements as well as precautions on explosion protection. Please confirm these precautionary items and use them to meet specification requirements.
For electrical wiring and maintenance servicing, please refer to “Internal Wiring Rules” in the Electrical Installation Technical Standards as well as “USER’S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry,” published in 1994.
To meet flameproof requirements, equipment that can be termed “flameproof” must:

(1) Be certified by a Japanese public authority in accordance with the Labour Safety and Health Laws of Japan and have a certification label in an appropriate location on its case, and
(2) Be used in compliance with the specifications marked on its certification label, equipment name plate and precautionary information furnished.

2. Electrical Apparatus of Flameproof Type of Explosion-Protected Construction

Electrical apparatus which is of flameproof construction is subjected to a type test and certified by the Japanese Ministry of Labour aiming at preventing explosion caused by electrical apparatus in a factory or any location where inflammable gases or vapours may be present. The flameproof construction is of completely enclosed type and its enclosure shall endure explosive pressures in cases where explosive gases or vapours entering the enclosure cause explosion. In addition, the enclosure construction shall be such that flame caused by explosion does not ignite gases or vapours outside the enclosure.
In this manual, the word "flameproof" is applied to the flameproof equipment combined with the types of protection "e", "o", "i", and "d" as well as flameproof equipment.

3. Terminology

(1) Enclosure

An outer shell of an electrical apparatus, which encloses live parts and thus is needed to configure explosion-protected construction.

(2) Shroud

A component part which is so designed that the fastening of joint surfaces cannot be loosened unless a special tool is used.

(3) Enclosure internal volume

This is indicated by:— the total internal volume of the flameproof enclosure minus the volume of the internal components essential to equipment functions.

(4) Path length of joint surface

On a joint surface, the length of the shortest path through which flame flows from the inside to outside of the flameproof enclosure. This definition cannot be applied to threaded joints.

(5) Gaps between joint surfaces

The physical distance between two mating surfaces, or differences in diameters if the mating surfaces are cylindrical.

Note: The permissible sizes of gaps between joint surfaces, the path length of a joint surface and the number of joint threads are determined by such factors as the enclosure's internal volume, joint and mating surface construction, and the explosion classification of the specified gases and vapours.

4. Installation of Flameproof Apparatus

(1) Installation Area

Flameproof apparatus may be installed, in accordance with applicable gases, in a hazardous area in Zone 1 or 2, where the specified gases are present. Those apparatus shall not be installed in a hazardous area in Zone 0.

Note: Hazardous areas are classified in zones based upon the frequency of the appearance and the duration of an explosive gas atmosphere as follows:
Zone 0: An area in which an explosive gas atmosphere is present continuously or is present for long periods.
Zone 1: An area in which an explosive gas atmosphere is likely to occur in normal operation.
Zone 2: An area in which an explosive gas atmosphere is not likely to occur in normal operation and if it does occur it will exist for a short period only.

(2) Environmental Conditions

The standard environmental condition for the installation of flameproof apparatus is limited to an ambient temperature range from –20°C to +40°C (for products certified under Technical Criteria). However, some field-mounted instruments may be certified at an ambient temperature up to +60°C as indicated on the instrument name plates. If the flameproof apparatus are exposed to direct sunshine or radiant heat from plant facilities, appropriate thermal protection measures shall be taken.

5. External Wiring for Flameproof Apparatus

Flameproof apparatus require cable wiring for their electrical connections. For cable wiring, cable glands (cable entry devices for flameproof type) to wiring connections shall be attached. All non-live metal parts such as the enclosure shall be securely grounded. For details, refer to the "USER'S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry," published in 1994.

(1) Cable Wiring

- For cable wiring, cable glands (cable entry devices for flameproof type) specified or supplied with the apparatus shall be directly attached to the wiring connections to complete sealing of the apparatus.
- Screws that connect cable glands to the apparatus are those for G-type parallel pipe threads (JIS B 0202) with no sealing property. To protect the apparatus from corrosive gases or moisture, apply nonhardening sealant such as liquid gaskets to those threads for waterproofing.
- Specific cables shall be used as recommended by the "USER'S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry," published in 1994.
- In necessary, appropriate protective pipes (conduit or flexible pipes), ducts or trays shall be used for preventing the cable run (outside the cable glands) from damage.
- To prevent explosive atmosphere from being propagated form Zone 1 or 2 hazardous location to any different location or non-hazardous location through the protective pipe or duct, apply sealing of the protective pipes in the vicinity of individual boundaries, or fill the ducts with sand appropriately.
- When branch connections of cables is made, a flameproof or increased-safety connection box shall be used. In this case, flameproof or increased-safety cable glands meeting the type of connection box must be used for cable connections to the box.

6. Maintenance of Flameproof Apparatus

To maintain the flameproof apparatus, do the following. (For details, refer to Chapter 10 “MAINTENANCE OF EXPLOSION-PROTECTED ELECTRICAL INSTALLATION” in the USER’S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry.)

(1) Maintenance servicing with the power on.

Flameproof apparatus shall not be maintenance-serviced with its power turned on. However, in cases where maintenance servicing is to be conducted with the power turned on, with the equipment cover removed, always use a gas detector to check that there is no explosive gas in that location. If it cannot be checked whether an explosive gas is present or not, maintenance servicing shall be limited to the following two items:

(a) Visual inspection
Visually inspect the flameproof apparatus, metal conduits, and cables for damage or corrosion, and other mechanical and structural defects.

(b) Zero and span adjustments
These adjustments should be made only to the extent that they can be conducted from the outside without opening the equipment cover. In doing this, great care must be taken not to cause mechanical sparks with tools.

(2) Repair

If the flameproof apparatus requires repair, turn off the power and transport it to a safety (non-hazardous) location. Observe the following points before attempting to repair the apparatus.

(a) Make only such electrical and mechanical repairs as will restore the apparatus to its original condition. For the flameproof apparatus, the gaps and path lengths of joints and mating surfaces, and mechanical strength of enclosures are critical factors in explosion protection. Exercise great care not to damage the joints or shock the enclosure.

(b) If any damage occurs in threads, joints or mating surfaces, inspection windows, connections between the sensor and terminal box, shrouds or clamps, or external wiring connections which are essential in flameproofness, contact Yokogawa Electric Corporation.

CAUTION

Do not attempt to re-process threaded connections or refinish joints or mating surfaces.

(c) Unless otherwise specified, the electrical circuitry and internal mechanisms may be repaired by component replacement, as this will not directly affect the requirements for flameproof apparatus (however, bear in mind that the apparatus must always be restored to its original condition). If you attempt to repair the flameproof apparatus, company-specified components shall be used.

(d) Before starting to service the apparatus, be sure to check all parts necessary for retaining the requirements for flameproof apparatus. For this, check that all screws, bolts, nuts, and threaded connections have properly been tightened.

(3) Prohibition of specification changes and modifications

Do not attempt to change specifications or make modifications involving addition of or changes in external wiring connections.

7. Selection of Cable Entry Devices for Flameproof Type

IMPORTANT

The cable glands (cable entry devices for flameproof type) conforming to IEC Standards are certified in combination with the flameproof apparatus. So, Yokogawa-specified cable entry devices for flameproof type shall be used to meet this demand.

References:

(1) Type Certificate Guide for Explosion-Protected Construction Electrical Machinery and Equipment (relating to Technical Standards Conforming to International Standards), issued by the Technical Institution of Industrial Safety, Japan

(2) USER’S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry (1994), issued by the Japanese Ministry of Labour, the Research Institute of Industrial Safet

Revision Information

- Title: Model DY Vortex Flowmeter
  Model DYA Vortex Flow Converter
- Manual No.: IM 01F06A00-01EN

Edition	Data	Page	Revised Item
3rd	Jun. 2002	1-1	1.1 Change Figure1.1(b).
		2-2	2.2 Change the process temperature range and ambient temperature.
		2-3	2.2 Add Pressure Equipment Directive, Change Figure 2.2.1.
		2-5	2.3 Change Table 2.3.1 “Body” of Cryogenic Version.
		2-6, 2-7	2.4 Change the process temperature range and ambient temperature.
		2-9	2.4 Change the process temperature range.
		2-10	2.4 Change Figure 2.4.1 , 2.4.2.
		4-2	4.2 Add the description of Table 4.1.
		6-1	6.3 Change the contents of parameter lists.
		6-6	6.3 Change a table of parameter list.
		6-10	6.4 Add the description of “B50 A/OUT SELECT”.
		7-3	7.2.2 Change a tuning method.
		9-1	9.1.1 Change the process temperature and ambient temperature.
		9-3	9.1.6 Change Data Plate.
		9-4	9.2.1 Change the process temperature and ambient temperature.
		9-5	9.2.5 Correct “WARNING” and Installation Diagram of Non incendive.
		9-6	9.2.6 Change Data Plate.
		9-8	9.4.1 Change the process temperature and ambient temperature.
		9-10	9.4.5 Correct the Installation Diagram of Non incendive.
		9-11	9.4.6 Change Data Plate.
		10-1	10 Change the technical data.
4th	Sep. 2003	2-4	2.3 Add BS1 to 5.
		2-5	Table 2.3.2 Add BS1 to 5.
		2-8, 2-9	2.4 Add Hydrostatic Pressure Test, etc.
		2-11	2.5 Table 2.5.1 Change the value for size 40 mm.
		3-10	3.7.3 Add the description.
		4-1	4.2 Figure 4.2 Add the description.
		4-3	4.4 Figure 4.5 Add the description.
		5-9	5.5 Figure 5.5 Add the description.
5th	Apr. 2004	i	CONTENTS Reconfiguration.
		iv	Add symbol mark, revision.
		vi	Revision.
		1-1	Revision.
		2-1/22	Revision of Specification, Move to Chapter 9.
		3-1/10	Revision, Move to Chapter 2.
		3-9	Revision, Move to Chapter 7.
		3-10	Add IMPORTANT, Revision, Move to Chapter 7.
		4-1/6	Move to Chapter 3.
		4-4/5	Revision, Move to Chapter 3.
		5-1/24	Revision, Move to Chapter 4.
		6-1/17	Revision, Move to Chapter 5.
		7-1/4	Change Chapter name MAINTENANCE to OPERATION.
		9-1/11	Revision, Move to Chapter 10.
		10-1	Move to Chapter 11.
		8-5/6	8.3 moves to Chapter 7.
		8-7/8	8.4 moves to Chapter 7.
6th	Jan. 2005	5-6	Correction.
		5-8	Added a parameter.
		5-16	Added a parameter explanation and corrections.
		9-5	Revision (MS code).
		9-8	Revision (Option Specification).
		9-13	Revision.
		9-18/25	Revision.
		10-7	Revision.
		10-8	Revision.
		10-9	Revision.
7th	July 2005	2-5	Added a “CAUTION” about heat insulating material installation.
		7-8	Revised the formura 7.14.3.
		9-3	Changed the EMC Conformity Standards No..
		9-6	Deleted DIN64 and DIN100 (Suffix Code: BD5 and BD6).
		10-1/13	Added Applicable Standard No.and Certificate No. to each Approval body.

Edition	Data	Page	Revised Item
8th	Nov. 2005	2-7	Revision: Vertical Installation.
		3-5	Revision: 7.
		4-21-25	Revision.
		4-24	Revision <K36>.
		5-15	H27: Revision.
		5-16	J10, J20: Revision.
		8-2	Revision.
		9-5	Revision of specification.
		9-6	Revision of specification.
		9-7	Revision of specification.
		9-8	Revision of specification.
		9-10	Table 9.4.3: Revision.
		9-11	Revision of specification.
		9-12	Revision of specification.
		9-14	Table 9.5.1: Revision.
		9-19	Tables: Revision.
		9-20	Tables: Revision.
		9-22	Tables: Revision.
		9-23	Tables: Revision.
		9-24	Revision.
9th	May 2006	2-2	Revision.
		2-3	Add a note to "Valve position (T-type pipe exist)" and "Heat - Insulation".
		3-4	Revision: Figure 3.6.
		4-9	Revision: Figure 4.5.
		5-1	Add a "IMPORTANT" to 5.2.
		5-5	Add Data Range to <E20>.
		5-13	Add descriptions to <E20>.
		5-14	Add a "IMPORTANT" to <F52>.
		7-2	Revision figures.
		7-3	Revision figures.
		7-5	Revision figures.
		Chap.9	Revision, Added optional items, etc.
10th	Nov. 2006	2-2	Add discviptions of /R2.
		4-14	Delete 4.6.2.
		5-13	Delete a note.
		7-1	Add to CAUTION.
		7-4	Add to CAUTION.
		9-5	Revisions.
		9-6	Add /R2.
		9-7	Add /R2.
		9-8	Revisions.
		9-9	Revision.
		9-10	Add /R2.
		9-11	Revisions.
		9-14	Add /R2.
		9-15	Add /R2.
		9-16	Add /R2.
		9-17	Add /R2.
		9-18	Add /R2.
		9-27	Revisions.
		9-28	Revisions.
		9-29/30	Add /R2.
		10-4	Revision.
		10-13	Revisions.
11th	Aug. 2008	3-3	Additions.
		4-1	Additions.
		4-21	Additions.
		5-2 to 8	Additions.
		5-11	Additions.
		5-13	Additions.
		5-14	Additions.
		6-1	Revisions of Figure 6.1.
		7-4	Additions of Table 7.1.
		7-5	Revisions of Figure 7.3.
		7-7, 8	Corrections.
		9-11 to 13	Additions.
		9-14, 15	Revisions.
		9-16	Corrections.
		10-1 to 12	Chap.10 Revisions.

Edition	Data	Page	Revised Item
12th	Mar. 2010	1-1	Figure 1 Revision.
		2-5	2.4 Revision.
		2-7	Table 2.3 Revision.
		3-2	Figure 3.2 Revision.
		3-3	Table 3.1 Revision.
		3-4	Figure 3.5 Revision.
		4-9	Figure 4.4 Revision.
		4-13 to 21	4.6 Revision.
		5-4	D10 Revision.
		5-8	K45 Revision.
		5-12	NOTE Revision.
		5-15	NOTE Revision.
		6-1	NOTE Revision.
		6-3	6.2.1 Revision.
		9-2	9.2 Revision.
		9-5 to 9-6	9.3 Revision.
		9-7 to 9-8	9.4.1 Revision and add an option specification.
		9-9	9.4.2 Revision.
		9-16	Revision.
		9-6 to 9-37	Revision and add /E1 drawings.
		10-11	10.5 Revision.
13th	Dec. 2011	5-12	Manual Change No. 10-005-1E
		5-15	
		10-1	
		10-2	
		10-3-1	
		10-3-2	
		vi	Add note (6).
		4-1	Revision and delete (Table 4.1)
		5-13	Revision (E30)
		7-4	Revision (Table 7.4)
		7-6	Revision (7.6 title)
		9-2	Revision (Specification changes)
		9-5	Revision (Specification changes, add MS Code)
		9-6	Revision (Specification changes, Table 9.3.1)
		9-7	Page alignment Table 9.3.2
		9-10	Revision (Specification changes, Table for MV)
		9-11/14	Revision (Specification changes, for Explosion proof)
		10-1/12	Revision (Specification changes, for Explosion proof)
		EX-B03E_2	Revision (Specification changes, for TIIS Explosion proof)
14th	Mar. 2012	vi	Add Warning; Wet location
		1-1	Correction (Chapter No.)
		2-6	Correction (Chapter No.)
		3-3	Add Note, *3
		5-5	Correction (unit)
		5-7	Correction (time unit)
		5-8	Correction (K45)
		5-12	Add parameter item D40,
		5-13, 14	Correction D43
		5-16	Correction (unit)
		Chapter 7	Revision (J40) Revision (HART5 and DTM menu tree)
		Chapter 8	Add HART7
		9-1	Add Note
		9-2	Minor amendment (ex.Chapter number)
		10-2	Revision 10.1
		10-4	Revision (10.5 Vortex Shedder Removal)
		10-7	Add Footnote
		Chapter 12	Add HART7, Revision of Ex-proof descriptions
		Chapter 13	Revision of Ex-proof descriptions

Edition	Data	Page	Revised Item
15th	Aug. 2012	2-3	Correction (Figure, Word)
		2-5	Correction (Word)
		3-7, 3-8	Correction
		5-2, 5-4, 5-5, 5-15	Correction
		7-5	Correction (Word)
		7-7	Add (RW)
		8-7, 8-8	Correction
		8-15	Correction (Word)
		8-18	Add (RW)
		8-19	Add (R)
		10-2	Revision
		10-4	Revision (Table 10.1)
		10-6	Correction
		12-3	Add table.
		12-5	Revision
		12-6	Revision
		12-8	Revision
		12-9	Revision (Note7, 8, 9)
		12-11	Correction
		12-12 to 12-14	Revision (Explosionproof)
		12-15	Add DY250/HT and DY300/HT
		12-19	Revision
		12-20 to 12-38	Revision
		13-1, 13-2, 13-4	Revision for ATEX
		13-5	Correction for FM
		13-7, 13-8	Add IECEx explosion proof
		13-12	Revision for the table of IECEx.
16th	Oct. 2013	Contents	Corrected
		1-3	Added to Trademarks
		3-1 to 3-4	Added to DY400
		4-3 to 4-4	Corrected Section 4.3
		4-8	Deleted ATEX Type n
		4-9	Added to Figure 4.12
		6-1 to 6-10	Added to DY400
		6-11	Added to description in parameter number A30
		6-15	Added to description in parameter number E10
		6-19	Added to description in parameter number K45
		11-2	Added to description for changing the converter and the terminal box orientation
		11-4	Added to DY400
		11-6	Corrected Figure 11.4
		13-1 to 13-41	Revised Chapter 13
		14-1 to 14-4	Deleted ATEX Type n
		14-4 to 14-6	Corrected FM
		14-14	Added to DY400
		15-1	Corrected Chapter 15
17th	Feb. 2014	4-1	Add CAUTION
		4-2	Add descriptions 4.2
		4-4	Add *5
		4-8	4.6 Delete SAA Intrinsically Safe Approval
		11-1	11 Delete SAA Intrinsically Safe Approval
		11-2	11.1 Delete SAA Intrinsically Safe Approval
		11-4	Change Table 11.1 Torque Value
		13-1	Change Degree of Protection, Revision
		13-2	Add *1 to Contact rating
		13-3	Change PED descriptions
		13-5	Change *10
		13-9	Change Note 8 and 9, Figure 13.5
		13-11	Revise Note 1
		13-20	Add Note(*), Revise ATEX Intrinsically Safe Approval
		13-21	Delete SAA Intrinsically Safe Approval, Add IECEx Intrinsically Safe Approval
		13-22/40	Delete Locking Screw descriptions
		14-1/4	Change ATEX Intrinsically Safe Approval descriptions
		14-7/8	Add Control Drawing descriptions
		14-9	Delete SAA Intrinsically Safe Approval, Add IECEx Intrinsically
		14-15	Revise TIIS Certification table
		15-1	Revise PED descriptions